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Do managers respond to tax avoidance incentives by investing in the tax function? Evidence from tax departments

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ABSTRACT

While prior literature examines the role of certain incentives in motivating top managers (CEOs and CFOs) to engage in corporate tax avoidance, there is little evidence on the specific actions that managers take in response to these incentives. Motivated by the premise that a manager can influence a firm's tax activities by directing resources towards the tax function, I investigate whether four specific tax avoidance incentives studied in prior literature (financial constraints, equity risk incentives, hedge fund interventions, and analyst cash flow forecasts) induce managers to make investments in hiring personnel within the firm's tax department. Using a dataset of tax department employees collected from the professional networking website *LinkedIn*, I find evidence that each incentive is significantly associated with an increase in the number of individuals employed within the tax department. This association is generally stronger among higher ranked employees and employees with prior tax department experience. Overall, my findings are consistent with the premise that managers invest resources in the tax function when they are incentivized to avoid taxes. My study also provides some assurance that the association between tax avoidance incentives and effective tax rates documented in prior studies is reflective of intentional tax avoidance behavior.

Introduction

A large subset of the tax avoidance literature examines incentives that motivate top managers (CEOs and CFOs) to engage in corporate tax avoidance. The most common empirical approach in these studies is to examine the relationship between a specific incentive and tax planning outcomes of the firm, such as effective tax rates (ETRs). However, one drawback of this approach is that it provides no evidence regarding the specific actions that managers take in response to these incentives. Managers are unlikely to involve themselves directly in developing or implementing tax strategies given that they are rarely tax experts. Instead, the literature argues that they have a 'tone at the top' effect on the firm's tax activities, which includes emphasizing the tax function when allocating resources across different functional areas of the firm (e.g. (Dyreng et al., 2010). Therefore, while prior studies focus on how tax avoidance incentives relate to *outputs* of the tax function (e.g. cash tax savings), managers will likely respond to these incentives by allocating resources to increase *inputs* into the tax function. Empirically, establishing an association between tax avoidance incentives and tax function inputs will provide stronger evidence regarding the effectiveness of these incentives. However, while tax function outputs are observable through publicly available financial statements, inputs are more difficult to measure.

In this study, I directly examine the relationship between tax avoidance incentives and inputs into the tax function – i.e. tax function investments. While investments in the tax function can be measured in different ways, I focus specifically on the quantity of tax

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personnel hired in the tax department. Indeed, (Mills et al., 1998) highlight that most tax function resources are allocated towards tax department personnel as opposed to outside assistance. The quantity of tax personnel hired is likely the most direct method of measuring tax department investments, has been shown in prior literature to be effective in generating tax savings (e.g. Chen et al., 2021, Barrios and Gallemore, 2023), and is publicly available through analyzing data from the professional networking website *LinkedIn.*

I construct a panel dataset of tax department employees collected from the *LinkedIn* website. Given widespread usage of the website among professionals, including tax accountants, it provides a reasonable estimate of the number of personnel employed within a firm's tax department. Validation tests using comparisons with tax department surveys confirm that *LinkedIn* is a reliable data source. I hypothesize that, if tax avoidance incentives encourage managers to engage in tax planning, then it should lead to managers hiring additional tax personnel. I use my dataset to test this prediction.

I identify four measures of tax avoidance incentives from the extant literature. Prior studies argue that managers with a greater need for additional cash flows will be more inclined to pursue tax avoidance activities as a means to reduce tax payments and increase the firm's cash balance. Following this argument, the literature finds that financial constraints (e.g. (Edwards et al., 2016) and analyst cash flow forecasts (Ayers et al., 2018) both incentivize managers to engage in tax avoidance in order to generate additional cash to finance operations and meet cash flow forecasts respectively. In addition, prior literature argues, under the assumption that managers view tax avoidance as risky and effort-intensive, that encouraging managers to engage in risky activities or exert effort can incentivize them to pursue tax avoidance. With respect to risk, (Rego and Wilson, 2012) find that providing managers with equity risk incentives (i.e. stock options) is an effective tax avoidance incentive. With respect to effort, (Cheng et al., 2012) find that activist hedge funds, through monitoring activities, can incentivize managers to exert the necessary effort to engage in tax planning.

I predict that each of these four factors, if effective as a tax planning incentive, is positively associated with the quantity of tax department personnel. To test this prediction, I construct a firm-year level measure of corporate tax department size by aggregating all US-based tax employees on *LinkedIn* who disclosed that they were working in the firm during the year (although I exclude employees working in a non-income tax role such as sales or property taxes). I scale this measure by the total number of employees in the firm to create my dependent variable for the quantity of tax department personnel.[1] Using variables to measure each of the four aforementioned incentives, I estimate the relationship between each incentive and the quantity of the firm's tax department personnel, controlling for other determinants of tax department size.

Overall, my main results support my primary hypotheses. First, using one of four indices to measure financial constraints,[2] and using the CEO or CFO's portfolio 'vega' to measure equity risk incentives,[3] I find a significantly positive relationship between these two tax avoidance incentives and tax department size. These results hold when conducting both a levels analysis which incorporates firm fixed effects to focus only on within-firm variation, and a change analysis. Next, using a difference-in-differences design with firm fixed effects, I find that firms experience a significant increase in tax department size after receiving a hedge fund intervention or an analyst cash flow forecast, relative to control firms. Overall, my results are consistent with the hypothesis that managers, in response to tax avoidance incentives, increase the resources allocated to the tax function.

Next, I examine the types of tax employees that managers are most likely to hire when responding to tax avoidance incentives. I hypothesize that employees with a more developed tax planning skillset are the most attractive investments for managers incentivized to engage in tax avoidance. I find evidence consistent with this hypothesis. Specifically, I find evidence that increases in tax department personnel hiring are more concentrated among senior-level tax employees (e.g. tax managers or executives), as opposed to junior employees (e.g. analysts or accountants). Among senior employees, I also find evidence that managers are more likely to hire tax personnel who have prior tax department experience over personnel with only accounting firm experience. In addition, as a falsification test, I find that the hiring of employees with skillsets oriented towards tax compliance, as opposed to tax planning, is not significantly associated with any of the tax avoidance incentives.

Finally, in a supplementary test, I find some evidence that tax function outsourcing, using auditor-provided tax service fees as a proxy, is significantly associated with certain incentives (financial constraints and hedge fund interventions), but only in the subset of firms that do *not* have tax departments. This suggests that managers with tax planning incentives may turn to tax function outsourcing when they do not have an internal tax function.

The findings of this study contribute to the extant tax literature in several ways. First, this study contributes to the literature examining tax avoidance incentives. Prior studies often provide evidence of the effectiveness of these incentives by showing that it reduces a firm's effective tax rates. However, this raises the question of whether these effects are reflective of intentional tax avoidance behavior, particularly in light of recent studies that question whether tax rate measures are adequately capturing tax avoidance (e.g. (Guenther et al., 2021); Edwards et al., 2018; Schwab et al., 2022). My study helps resolve this issue by showing that managers engage in a specific action (the employment of tax personnel) in response to these incentives. In addition, by highlighting that inputs to the tax

[1] I choose to scale tax department size by total employees for three reasons: First, it is consistent with prior literature (i.e. (Brav et al., 2010); (Edwards et al., 2021)). Second, it allows both the numerator and denominator to be denoted in the same unit of measurement, allowing the measure to be interpreted easily and preventing confounding factors such as inflation. Finally, there is intuitive appeal in the measure conceptually, as it examines how much of the firm's *human capital* investments (which are fundamentally different than tangible investments) are directed towards the tax function.

[2] The financial constraint measures used are: the Altman's Z-score, the Kaplan and Zingales KZ Index, the Whited and Wu WW Index, and the fraction of negative words in 10-K filings.

[3] The portfolio vega represents the change in the executive's stock option portfolio value for a 1% increase in the firm's stock price volatility.

function are sensitive to managerial incentives, I provide additional evidence of the 'tone at the top' influence that managers have over the firm's tax activities. Future studies examining whether a certain factor incentivizes managers to engage in tax avoidance may also want to consider how that incentive maps into the firm's tax function inputs, such as the number of tax personnel employed.

Second, this study contributes to the newly developed literature highlighting the role of the tax department within the firm. Most studies in this area have focused on the consequences of various tax department characteristics on the firm's tax outcomes. (Chen et al., 2021) find a firm's tax department size, as well as the relative focus of the tax department (on tax planning vs. tax compliance), influences a firm's tax avoidance and tax risk. (Barrios and Gallemore, 2023) find that a firm's tax avoidance increases when their tax department hires employes from low-tax firms. Finally, (Ege et al., 2021) find that the power and status of the tax department, measured using the rank of the firm's top tax executive, influences the firm's tax planning outcomes. While these aforementioned studies focus on how tax departments can influence tax outcomes, little is known about the antecedents of tax department investments – i.e. the factors that drive managers to invest in tax departments in the first place. By linking this literature to four different studies examining tax avoidance incentives, I provide evidence regarding when managers will hire additional tax department personnel.

Third, this study provides evidence supporting the argument that tax avoidance is a costly investment, as managers who are incentivized to avoid taxes will commit capital towards employing tax personnel. Prior studies (e.g. (McClure, 2023) suggest that there are specific costs and operational frictions imposed by tax avoidance that discourage managers from pursuing all possible tax planning opportunities. However, the literature has not found substantial evidence that these costs are borne from reputational costs (e.g. (Gallemore et al., 2014) nor increased exposure to risk (Guenther et al., 2017). My study highlights that one cost involved in tax avoidance is the upfront cost of tax function investment, and this may help explain why some managers appear to under-exploit tax planning opportunities.

Finally, this study provides some evidence, in a specific setting, on how managers allocate firm resources toward different divisions within the firm. Most prior evidence on this research question is survey-based (e.g. (Graham et al., 2015) due to a lack of disaggregated data. I provide evidence that managers allocate more resources towards hiring within the tax department when they have an increased appreciation for the outputs of that department (i.e. when they have a greater incentive to engage in tax planning and receive tax savings). This can translate to a more general finding that managers allocate more capital towards firm divisions when they assign a greater value to the outputs of that division.

The remainder of this paper is organized as follows. Section 2 provides a literature review of related studies and develops my main hypothesis. Section 3 discusses the data used in the study and the research design employed. Section 4 presents the main results of the analysis as well as some supplementary results. Finally, section 5 concludes the study and discusses some implications of my findings.

Background and hypothesis development

Tax avoidance incentives

Motivated by (Dyreng et al., 2008), who find considerable variation in tax avoidance among US public firms, many tax studies have focused on investigating a variety of determinants of corporate tax avoidance. A large subset of this literature examines incentives that managers have to engage in tax avoidance activities. Studies find that managers requiring additional cash flow for their firms, either due to financial constraints (Edwards et al., 2016); (Law and Mills, 2015) or analyst cash flow forecasts (Ayers et al., 2018), avoid more taxes to generate the required funds. Studies also find that components of executive compensation are effective motivators for risk and effort-averse managers to engage in tax avoidance, including equity risk incentives (Rego and Wilson, 2012), after-tax compensation (Gaertner, 2014), and labor market incentives (Kubick and Lockhart, 2016). Finally, studies show that other stakeholders, including activist hedge funds (Cheng et al., 2012) and institutional shareholders (Khan et al., 2017), may provide the necessary motivation for managers to engage in tax avoidance.

In most of these studies, researchers establish an empirical link between a specific tax avoidance incentive faced by the manager and a measure representing the firm's tax avoidance outcomes, such as effective tax rates or book-tax differences. However, given that managers are rarely tax experts (Dyreng et al., 2010), it is unlikely that managers with tax avoidance incentives are able to directly influence the firm's tax outcomes. Prior literature argues, however, that managers are able to indirectly influence tax outcomes through 'tone at the top' effects, including the allocation of additional resources to the firm's tax function (e.g. (Dyreng et al., 2010); (Christensen et al., 2015); (Chi et al., 2017). Therefore, while prior studies examine the relation between incentives and tax planning outcomes, which is an *output* of the tax function, this relationship is likely driven by the manager's willingness to increase *inputs* into the firm's fax function in response to these incentives. Motivated by this argument, I investigate the relationship between tax avoidance incentives and tax function investments.

Tax function investments

The tax literature often frames corporate tax avoidance as an 'investment' (e.g. (Kubick et al., 2015), suggesting that a commitment of capital is required to engage in tax avoidance activities.[4] Indeed, prior literature, often using survey data, suggests that firms incur substantial expenditures towards their tax function. For example, using a 1992 survey of large U.S. corporations on their tax planning

[4] (McClure, 2023) find that firms treat their tax sheltering activities as part of their overall investment strategy, with investments in tax sheltering being associated with firms' investment opportunity sets, operating uncertainty, and capital market pressure.

costs, (Mills et al., 1998) find that firms on average spend 0.4 % of their SG&A costs on their tax function, representing approximately $1.2 M for the median firm in their sample. Similarly, (Slemrod and Venkatesh, 2002) use a 2001 survey of both medium-sized and large businesses to find that tax compliance costs increase with respect to firm size, with firms over $1B of assets spending on average $1.3 M on their tax function.

Prior studies also find that firms obtain substantial returns from tax function investment. (Mills et al., 1998) find that firms on average obtain $4 of tax savings per $1 spent on their tax function. (Omer et al., 2006) show that firms obtain tax rate reductions from engaging in auditor-provided tax services, although these effects were reduced following the Sarbanes-Oxley Act of 2002. (Lynch, 2016) find that firms that make internal or external tax function investments, in order to remediate tax-related internal control weaknesses, exhibit greater tax avoidance in future years. Finally, (Chen et al., 2021) find that firms with larger corporate tax departments exhibit greater tax avoidance and lower tax risk.[5] Overall, the literature suggests that tax function investments are a substantial input into achieving beneficial tax planning outcomes.

The relationship between tax avoidance incentives and tax department personnel

Given the findings in prior literature that tax function investments yield substantial returns, managers who are incentivized to avoid taxes will likely make additional investments in the tax function. While tax function investments may be measured in several different ways, in this study I use the quantity of tax personnel hired in the tax department as my primary measure. Since (Mills et al., 1998) find that most resources in the tax function are allocated towards tax department personnel as opposed to outside assistance, focusing on the tax department as opposed to external services (e.g. auditor-provided tax services) can capture a larger portion of tax function spending.[6] Although resources allocated towards the tax department can be spent on other activities aside from personnel hiring, such as training or employee benefits, the quantity of tax personnel is likely the most direct way of measuring tax department resources and is publicly available through *LinkedIn* data. Indeed, (Chen et al., 2021) uses the quantity of tax employees to measure overall in-house tax investments, and (Ege et al., 2021) uses the number of personnel involved in tax planning and tax compliance to measure overall resources directed towards the two respective activities. Finally, prior literature has established the relationship between tax avoidance outcomes and the hiring of tax personnel (e.g. (Chen et al., 2021); (Barrios and Gallemore, 2023)), and thus managers may plausibly hire personnel to generate tax savings. Many other aspects of tax department spending (e.g. training or employee benefits) has not yet been linked to successful tax avoidance outcomes.

(Chen et al., 2021) highlight that tax personnel are engaged in two roles – tax planning and tax compliance. Common tax planning activities include managing numerous tax planning mechanisms such as corporate structure and reorganization, M&As, transfer pricing, and foreign earnings repatriation, whereas tax compliance activities include filing tax returns, monitoring tax-related internal controls, and managing financial reporting related to taxes. Managers who wish to lower the firm's tax liability would evaluate the existing tax department's ability to successfully fulfill the former role and may identify a lack of knowledge and competency necessary to implement additional tax strategies, such that further hiring is required. For example, a manager may wish to lower the firm's tax liability through multinational tax planning and profit shifting, but current tax employees may not have sufficient knowledge of international tax law or transfer pricing. Therefore, the manager may need to allocate additional resources to hire a tax director with sufficient international tax knowledge. Further, IRS scrutiny is likely to increase following an increase in tax avoidance, and tax personnel may be required to manage the audit process.

A subset of the tax avoidance incentives I examine focuses on managers' need for cash flows (i.e. financial constraints and analyst cash flow forecasts). (Graham et al., 2015) find, in a survey of top executives, that managers of financially constrained firms prioritize the timing of cash flows when making capital allocation decisions across the firm. Therefore, managers facing these incentives may reallocate funds towards additional hiring in the tax department, as opposed to divisions where returns on investment are delayed (e.g. R&D divisions). Indeed, (Chen et al., 2021) find that hiring additional tax employees has an immediate effect on the cash tax savings of the firm, and (Barrios and Gallemore, 2023) find that hiring a tax employee from a tax-aggressive firm leads to reductions in tax payments in a short period after hiring.[7] Therefore, the tax strategies arising from additional tax department hiring appear to be implemented quickly and lead to timely tax savings, motivating managers in need of cash flows to invest in hiring within the tax department.

One implicit assumption made in this study is that managers may underinvest in tax personnel hiring in the absence of specific incentives. (Jensen and Meckling, 1976) argue that if an action is costly to the manager but provides net benefits to the firm, managers need incentives to take the action. In this context, personnel hiring can be costly to a manager in several ways. First, there is a direct financial cost, since compensation paid to tax personnel lowers the firm's pre-tax income and reduces the manager's bonus

[5] In untabulated analyses, I was able to successfully replicate the main results of (Brav et al., 2010), confirming that larger tax departments are indeed associated with higher levels of tax avoidance.

[6] In a supplementary test, I also examine the relationship between tax avoidance incentives and auditor-provided tax service fees.

[7] Both studies employ one-year Cash ETRs to measure tax avoidance in this portion of their respective studies, so that the results reflect the short-term effects of hiring tax employees. Please see Table 8, Panel A of (Brav et al., 2010) and Table 3 of (Ayers et al., 2018) for more details.

compensation. However, the returns from these investments (i.e. reductions of tax payments) may not affect the manager's compensation if: i) the manager is compensated using pre-tax, rather than after-tax, income,[8] or ii) the tax strategies implemented are deferral strategies that do not affect the tax expense and thus will not increase net income.[9] Second, a risk-averse manager may avoid tax personnel hiring as returns on investment derived from tax planning involve some degree of uncertainty (Rego and Wilson, 2012). Ex ante, managers may not be able to predict the amount of incremental tax savings generated, and may view tax avoidance as an inherently risky activity that they are hesitant to commit firm resources to. Prior literature finds evidence that certain incentives are effective in motivating managers to pursue risky investments (e.g. (Coles et al., 2006); (Rajgopal and Shevlin, 2002). Analogously, tax avoidance incentives may be effective in motivating managers to devote firm resources towards tax department hiring.

Finally, effort-averse managers may find activities such as the hiring and management of tax personnel to be effort-intensive. (Bertrand and Mullainathan, 2003) investigate managerial preferences in the absence of appropriate governance mechanisms and find that managers prefer to live the 'quiet life' and avoid difficult decisions and costly efforts associated with investments. With respect to employment, they find that managers without proper incentives will raise wages to reduce turnover and 'buy peace' from workers. Thus, tax personnel hiring and associated activities such as compensation and performance evaluation may be costly actions for managers. Further, consistent with prior literature showing that managers prefer allocating capital towards divisions that they are familiar with (e.g. Ang et al., 2014), managers may inherently be reluctant to invest in the tax function given their limited knowledge of taxes.

Overall, there is substantial motivation supporting the argument that tax personnel hiring is costly for managers, such that tax avoidance incentives can be effective in increasing the manager's willingness to take this costly action. My main hypothesis follows:

H1: Managers hire additional personnel within the tax department when provided with tax avoidance incentives.

There are several reasons, however, to expect that tax avoidance incentives may not lead to additional tax department personnel. If managers, on average, do not utilize the firm's existing tax personnel efficiently in generating tax savings, then tax avoidance incentives may instead induce managers to change the structure or the incentives of the tax department to optimize returns, holding tax department size constant. Managers may, for example, shift the focus of the tax department from a cost center to a profit center (Robinson et al., 2010), or change the compensation incentives of the tax director (Armstrong et al., 2012b), in order to better utilize the tax department without needing to hire additional personnel.

Second, many tax avoidance incentives studied in prior literature are also likely to change the marginal costs and benefits of a variety of non-tax investments. Facing limited firm resources, managers make trade-offs between different types of investments. For example, increases in equity risk incentives may increase the attractiveness of a variety of risky projects. To the extent that these projects increase firm risk more so than tax avoidance, the manager may divert resources to these other areas instead, as opposed to the tax function.

Third, the process of hiring tax employees is not instantaneous. A recent article published by the Business Insider states that companies take an average of 44 days to successfully hire an open role after job posting[10] and the time elapsed may be higher for "difficult to fill" positions, which can include tax professionals given the skillset required. For certain short-term incentives such as financial constraints, the time elapsed may dissuade managers from hiring tax department personnel. Although we previously argued that the hiring of tax personnel can result in cash tax savings quickly, managers facing short-term incentives may have even quicker means of generating funds, leading them to pursue alternative channels as opposed to tax department hiring.

Finally, managers may increase tax function investments without necessarily needing to invest in the tax department. They may instead engage external tax consultants, either from their auditor or a third party. (Slemrod and Venkatesh, 2002) find that approximately 25 % of all tax function spending is allocated to external costs, and (Klassen et al., 2016) show that 45 % of firms in their sample have tax returns that are prepared by external parties. This suggests that a non-trivial portion of total tax function investments is allocated to external parties. Overall, whether managers will hire tax personnel in response to tax avoidance incentives, as opposed to one of these other alternative investments, is an empirical question.

Data and research design

Data and sample selection

I obtain data on corporate tax departments from the professional networking website *LinkedIn. LinkedIn* is the largest professional networking website in the world, with over 900 million members and 60 million firms worldwide registered. Employees who post their professional resumes on the website disclose information on their current and prior work experiences, including job titles, employers, and the time period employed. As discussed earlier, prior tax studies use *LinkedIn* to examine the influence of tax department size (Chen et al., 2021), and hiring from tax avoidant firms (Barrios and Gallemore, 2023), on tax planning outcomes. Using the information provided by tax employees on *LinkedIn,* I construct a firm-year panel dataset of corporate tax departments.

I begin my data collection process by identifying a list of US public corporations on *Compustat*, and searching each of these

[8] (Ege et al., 2021) find that approximately 40% of firms in his sample compensate the CEO using pre-tax, rather than after-tax, income.

[9] This argument is consistent with (Graham et al., 2005), who show that managers are fixated on GAAP earnings at the expense of shareholder value. It is also consistent with (Gallemore et al., 2018) who find that public corporations are particularly concerned with whether a tax strategy leads to reporting a higher earnings per share.

[10] Please see: https://www.businessinsider.com/how-long-it-takes-to-hire-hired-banking-tech-report-2023–7.

Table 1
Panel A – sample selection.

	Firms
Number of US-incorporated firms in Compustat after the year 2000 with non-missing assets over $10 M	**11,694**
Less: Financial firms (SIC 6000–6899)	(2,658)
Less: Firm with consistently missing Compustat data	(2,150)
Total number of firms searched on the *LinkedIn* website	**6,886**
Number of Firms with Tax Employees:	3,311
Number of Firms without Tax Employees*:*	3,575
Total Number of Firm-Years:	65,647
Less: Firm-Years with missing financial data on Compustat:	(18,785)
Number of Observations in Sample:	**46,862**[46]
Number of Firm-Years with Tax Employees:	23,833
Number of Firm-Years without Tax Employees:	23,029

Panel B – Employees in Sample

	Number of firm-employees
Total number of tax employees based in the United States and employed in a sample firm-year	**39,919**
Less: Employees who did not work in the income tax function (e.g. sales tax, payroll tax, property tax)	(8,797)
Number of Income Tax Employees:	**31,122**
Number of Analysts:	**14,450**
Number of Managers:	**9,450**
Number of Executives:	**7,222**

Note: This table depicts the procedures for selecting the employees in my sample and the respective sample sizes.
Note: This table depicts the procedures for selecting the firms in my sample and the respective sample sizes.
[46]Note that the final number of observations in each regression will be dependent on the data availability of the tax avoidance incentive variable. Analyses involving incentive data that is only collected for S&P 1500 firms (i.e. CEO & CFO equity risk incentives and hedge fund activism) will have a much smaller sample size.

corporations on *LinkedIn* to identify tax employees with current or prior work experience in the firm. Table 1, Panel A provides details on the sample selection procedures employed during this process. I begin with a total of 11,694 US-incorporated public corporations listed in the Compustat database after the year 2000 with non-missing total assets over $10 M.[11] Next, I remove firms in the financial services industries (SIC codes 6000–6899) following prior literature,[12] and firms that are consistently missing basic financial information on Compustat.[13] Following these restrictions, a total of 6,886 firms remain in the sample. Note that, in contrast to prior studies using *LinkedIn*, I do not restrict my data collection to S&P 1500 firms. This is important for the purposes of this study, as several tax avoidance incentives (e.g. financial constraints) may be more prevalent among smaller firms.

For each of these firms, I conduct searches on *LinkedIn* to identify tax employees who worked in the firm during each year between 2000 and 2017. I begin my sample in 2000 as *LinkedIn* entries are sparse prior to that period, and I end my sample in 2017 to mitigate the influence of the Tax Cuts and Jobs Act (TCJA) which may cause abnormal changes in tax employee hiring in response to the tax reform. I use the firm's corporate legal name, as well as variants of that name, as search inputs during this process. After entering the firm name, I add additional search parameters to extract a list of relevant tax employees. I require the individual to be geographically located in the United States[14] and, consistent with (Chen et al., 2021), the word 'tax' needs to be in their job title during their employment with the firm.[15] In addition, I exclude employees who are 'tax interns' given the temporary nature of these jobs. After entering these search parameters on *LinkedIn* for a given firm, a list of tax employees who have worked, or are currently working, in the firm are identified. Note that each firm only needs to be searched once, rather than by year, as the search would identify tax employees who have worked in the firm in any given year.

For each employee identified, I extract information on the employee's job title(s) in the firm, the years when they worked for the firm, their other work experience, and their educational background. The employee is then linked to the corporation's data on

[11] I exclude extremely small firms as these firms are unlikely to have a tax department, and firms that only exist prior to the year 2000 as employee working for these firms may have retired and not have a *LinkedIn* account.

[12] In addition, since many financial services firms offer tax services to clients as well (e.g. (Gaertner, 2014), it is difficult to distinguish (from the job title alone) a tax employee that works in the firm's internal tax function from a tax employee that works in providing external client services. Following this argument, I also exclude firms that offer tax services as part of their business model (e.g. H&R Block, ADP, Paychex).

[13] Firms consistently missing variables such as leverage, PP&E, sales, Pretax income, or taxes paid are excluded.

[14] This implies that my measure of tax department size excludes tax personnel located in foreign subsidiaries. I exclude these employees for two reasons. First, the majority of tax planning related activities, such as transfer pricing, is centralized in the headquarters location for most firms (e.g. the 2018 KPMG Global Tax Department Benchmarking Survey), while regional tax employees primarily focus on compliance to foreign tax law. Therefore, foreign tax department size will likely be less sensitive to tax avoidance incentives (and more likely to be affected by other confounding factors such as geographical expansion). Second, *LinkedIn* is less prominent in foreign countries, suggesting that foreign tax department size will be measured with significant error.

[15] Since I provide descriptive statistics on total tax department size, including employees who work outside of the income tax function, I do not filter out non-income tax employees at this stage of the data collection process.

Compustat during the fiscal years that aligns with the months and years that the employee worked in the firm. Among the 6,886 firms searched, there are a total of 3,311 firms (48 %) that have at least one tax employee employed in the firm during the sample period. As expected, most firms without tax employees are quite small. Among S&P 1500 firms, only 15 % of firms do not have a tax department during the sample period.

To construct my initial sample of firm-year observations, I retain post-2000 observations from all 6,886 firms regardless of whether the firm has a tax department. Since my objective is to examine the relationship between tax avoidance incentives and tax department size, it is necessary to retain observations from firms that do *not* hire a tax department during the sample period, despite potentially being incentivized to do so. Excluding these observations would remove firms that choose not to respond to tax avoidance incentives by constructing a tax department, thus biasing the sample in favor of confirming my hypothesis. In total, there are 65,647 firm-years across all firms in the sample, which is reduced to 46,862 observations after removing observations with missing data for control variables. Approximately half of these firm-years have at least one tax employee working in the firm. This sample size is reduced further in subsequent tests depending on the data availability of the incentive variables (when data is only available for S&P 1500 firms, the sample size is less than half of the total).

Table 1, Panel B shows the total number of tax employees present in my sample. A total of 39,919 US tax employees were employed in at least one of the firm-years in my final sample. Since my study examines how firms respond to incentives to engage in income tax avoidance, I exclude employees who, judging from their job titles, are employed solely outside of the income tax function (e.g. sales tax, property tax, and payroll tax employees), leaving me with a total of 31,122 income tax employees. Finally, based on the job title reported by the employee during each year of their tenure, I divide the employee-year observations into three categories (analysts, managers, and executives) with the lowest seniority level being an 'analyst', and the highest being an 'executive'.[16] In Table 1, Panel B, I present the sample sizes for each seniority category on the employee level, using the seniority assigned to the employee in the year they were hired. This table shows, as expected, that the number of employees is decreasing in seniority level, with firms hiring more managers than executives, and hiring more analysts than managers.[17]

Data validation

Since *LinkedIn* membership is voluntary, there may be a significant sample selection bias concern since not all tax employees will post their information on the website, introducing a potential downward bias with respect to tax department size. In order to validate my dataset, I compare my sample data to a tax department survey conducted by the Tax Executives Institute (TEI) (Tax Executives International Inc, 2012). The TEI surveyed approximately 500 chief tax officers internationally during 2011–2012 and report that, on average, there are 10.6 tax employees employed in a corporation. Among respondents, approximately 70 % of firms have assets over $1B. To facilitate a comparison, I restrict my dataset to firms with a tax department in 2011 and 2012. Further, since only 60 % of firms in my sample have over $1B in assets during these years, I exclude the smallest 10 % of firms. After constructing a comparative sample, I find an average of 9.73 tax employees per firm. Therefore, while there appears to be a slight downward bias in tax department size (as expected) due to *LinkedIn* coverage not being completely comprehensive, the discrepancy appears to be minor. The TEI survey also finds that 18 % (9 %) of respondents have 10–25 (over 25) tax employees. In my comparative sample, the statistics are very similar, with 18.8 % (7.4 %) of sample firms in the respective categories. Overall, these comparisons suggest that *LinkedIn* coverage for tax employees appears to be fairly comprehensive, with only minor deviations.

One additional concern is that, since the sample period begins in the year 2000,[18] there may be additional selection bias as tax employees in the earlier years of my sample may have left the workforce and thus will not have a *LinkedIn* account. While my research design (outlined in section 3.3) attempts to mitigate these concerns through year fixed effects, I also compare my sample to a 2001 corporate taxpayer survey conducted by (Slemrod and Venkatesh, 2002) to assess the magnitude of this potential bias. (Slemrod and Venkatesh, 2002) survey a sample of corporate taxpayers drawn from corporations under the purview of the Large and Mid-Size Business (LMSB) Division of the IRS. Among firms with over $1B of assets, they find, on average, that firms spend approximately $1.33 M on tax compliance costs and 60 % of these costs (approx. $800,000) are attributed to internal personnel costs. Assuming an average of $80,000 per employee,[19] this represents approximately 10 tax department employees per firm. Comparing this to my sample of tax department firms with over $1B in assets in 2001, I find an average of 8.77 tax employees. While the discrepancy is larger than the 2011 comparison, as expected, it does not appear to be extreme. Nevertheless, to the extent that sample selection may bias the results, the results in this study should be interpreted with caution.

[16] For example, job titles containing the words 'analyst', 'accountant', 'specialist' and 'associate' are designated as analyst-level employees, job titles containing the words 'supervisor', 'manager', and 'attorney' are designated as manager-level employees, and job titles containing the words 'president', 'director' and 'counsel' are designated as executive-level employees. These classifications are consistent with (Brav et al., 2010). I validate these classifications by examining unusual cases of promotions and demotions, and re-classify employees' seniority levels as appropriate.

[17] When calculating the sample sizes on an employee-year level, I find that 38% of the sample represents analyst observations, 33% represents manager observations, and 29% represents executive observations.

[18] Since my research design incorporates firm fixed effects to exploit within-firm variation in internal tax function spending, it is necessary to have a sufficient number of years per firm. Further, certain tax avoidance incentives (e.g. hedge fund interventions) are more prevalent in the early/mid 2000s relative to more recent periods (e.g. (Khan et al., 2017). For these reasons, I do not restrict my sample to only the more recent period.

[19] The average 2023 salary for a tax manager is $134,600, according to salary.com, which represents approximately $80,000 in inflation-adjusted 2001 dollars.

Selection of tax avoidance incentives

I survey the tax literature for studies that examine specific incentives for managers to engage in corporate tax avoidance. My objective is to select a variety of different incentives studied in prior literature that motivate managers to focus on the firm's tax function, thereby leading to tax personnel hiring. I focus on published studies which conclude that a specific incentive increases the firm's level of tax avoidance, including studies where the emphasis is on more aggressive forms of tax avoidance (e.g. tax sheltering).

I use two criteria when selecting tax avoidance incentives from prior studies. First, I require the incentive data to be publicly available and feasible to collect for a large panel dataset of firm-years, which excludes several studies that employ survey methodologies (e.g. (Graham et al., 2014) and studies that focus on small samples (e.g. (Gaertner, 2014). Second, I require the tax avoidance incentive variable to exhibit significant within-firm variation, as my research methodology focuses on how managers respond to within-firm changes in incentives.[20] Following these criteria, I select four tax avoidance incentives from four different studies. I briefly discuss each of these studies below, and describe the data and variables used for each of the tax avoidance incentives. Detailed variable definitions are provided in appendix A.

Financial constraints

(Edwards et al., 2016) and (Law and Mills, 2015) both hypothesize that managers of firms that become financially constrained – i.e. firms that experience increases in their external financing costs or decreases in their ability to access funding, will increase tax planning activities in order to obtain additional internal funds. Consistent with expectations, both studies find that firms experiencing increases in financial constraints exhibit significant declines in cash effective tax rates (Cash ETR).[21] To measure financial constraints, I follow (Edwards et al., 2016) and use the (Altman, 1968) Z-score, the (Kaplan and Zingales, 1997) KZ Index, and the (Whited and Wu, 2006) WW Index.[22] The KZ index and WW index are measures intended to capture firms that experience investment-related financial constraints, while the Z-score is designed to capture firms in financial distress. All measures are computed using financial statement variables available on Compustat. I also follow (Law and Mills, 2015) and measure financial constraints using the percentage of words in the firm's 10-K that carry a negative tone.[23] Finally, I combine the four constraint measures together into one combined index using Principal Components Analysis (PCA), extracting the first component.

CEO/CFO equity risk incentives

(Rego and Wilson, 2012) argue that, when provided with equity risk incentives (i.e. executive stock options), risk-averse managers are incentivized to make more risky decisions in order to maximize their personal wealth. Since the pursuit of aggressive tax positions is considered a risky activity for the firm, due to the likelihood of being challenged by tax authorities as well as potential reputational costs, the authors predict that equity risk incentives will lead to an increase in firms' tax aggressiveness. They find a significant relationship between both CEO and CFO equity risk incentives and various empirical proxies for tax aggressiveness. Following (Rego and Wilson, 2012), I employ a measure of equity risk incentives developed in (Guay, 1999) and (Core and Guay, 2002) – the 'portfolio vega' of the CEO and CFO. This measure computes the sensitivity of the CEO's stock option portfolio value to a 1 % increase in the firm's stock return volatility, using the Black-Scholes options pricing model. The inputs to this calculation are available in the Execucomp database.[24]

Hedge fund activism

(Cheng et al., 2012) examine the relationship between hedge fund activism and corporate tax avoidance. They hypothesize that effort-averse managers prefer to limit the effort and risk associated with tax planning, and that hedge fund activists can, through informed monitoring, incentivize managers to employ tax avoidance strategies that enhance firm value. They find evidence that firms exhibit greater levels of tax avoidance following an intervention event by a hedge fund activist. To identify hedge fund activism events in my sample, I begin with the Schedule 13D filings database constructed by AuditAnalytics.[25] Next, I use the Bloomberg database, as well as internet searches, to identify whether each 13D filer is a hedge fund,[26] and use the results to determine whether each firm in my sample has been targeted by a hedge fund, as well as the first year that the hedge fund intervention began. To make the data collection

[20] For example, (Haltiwanger et al., 1999) find a relation between a firm's business strategy and its tax aggressiveness, arguing that 'prospector' firms have greater willingness to undertake the risk and uncertainty associated with tax avoidance. A firm's business strategy, however, is unlikely to change significantly over time, and thus it is not a suitable candidate for this study.

[21] (Kubick et al., 2015) also find that financially constrained firms report higher UTB reserves and increase tax haven usage.

[22] Note that (Edwards et al., 2016) did not tabulate results for the WW index, but used it as a robustness test.

[23] Examples of 'negative words' include: loss, limited, adverse, impaired, and against. I thank Bill McDonald for providing this data on his website.

[24] I thank Lalitha Naveen for providing the data and computation methodology for the CEO and CFO portfolio delta and vega used in (Christensen et al., 2015) on her website. Note that, as of the time of data collection, the data she provided only extended to 2014.

[25] When an investor acquires a 5% or greater stake in a public corporation, they are required to file a Schedule 13D form with the SEC within 10 days and declare their intentions to influence the firm and its managers.

[26] Following (Khan et al., 2017), I only conduct searches on frequent Schedule 13D filers – i.e. activists that have launched a minimum of three activism campaigns during my sample period.

process more manageable, and to allow control variables to be included for executive compensation,[27] I focus only on hedge fund interventions for S&P 1500 firms in this analysis. Finally, I separate observations for each hedge fund target firm into a pre and post period (split on the first year the firm is targeted by a hedge fund activist) and compare tax department sizes between the two periods, relative to untreated firms, in a difference-in-differences design.

Analyst cash flow forecasts

Finally, (Ayers et al., 2018) examine changes in firms' tax planning behavior after analysts begin issuing cash flow forecasts for the firm. They predict that, due to the substantial cash tax savings yielded from tax avoidance, managers of cash flow forecast firms will be incentivized to increase tax avoidance activities in order to improve the firm's cash flow health and meet these forecasts. They find substantial reductions in firms' cash tax payments after the initiation of cash flow forecasts. Following this study, I utilize the I/B/E/S detail file database to identify firms with cash flow forecasts issued for them, as well as the first year in which analysts began issuing these forecasts for each firm. I separate observations for each cash flow forecast firm into a 'pre-forecast' and a 'post-forecast' period to analyze the difference in tax department size, relative to untreated firms, between the two periods in a difference-in-differences design.[28]

Research design

Since the quantity of tax personnel is the most direct proxy in examining tax department investments, I construct my dependent variable using the number of income tax function employees working in the firm during the year. Next, I scale this variable by the total number of employees in the firm (in thousands). I use the number of employees as the denominator of choice for three reasons. First, it is consistent with prior literature examining tax department investments (i.e. (Chen et al., 2021); (Ege et al., 2021). Second, it allows both the numerator and denominator to be represented in the same unit of measurement (i.e. number of people), preventing measurement issues that may arise if scaling by dollars, such as inflation.

Using *TAXDEPT_SIZE* as the dependent variable, I estimate the following regression model using ordinary least squares (OLS):

$$\begin{aligned} TAXDEPT\_SIZE_{i,t} = {} & \beta_0 + \beta_1 INCENTIVE_{i,t} + \beta_2 SIZE + \beta_3 LN\_SEGMENTS + \beta_4 \\ & ROA + \beta_5 BTM + \beta_6 FIRM\_AGE + \beta_7 LEVERAGE + \beta_8 PPE + \beta_9 R\&D \\ & + \beta_{10} INTANG + \beta_{11} INVENTORY + \beta_{12} SG\&A + \beta_{13} NOL \\ & + \beta_{14} CHANGE\_NOL + \beta_{15} FOR\_DUMMY + \beta_{16} FOR\_INCOME \\ & + \beta_{17} LN\_HAVENS + \beta_{18} TAXFEES\_DUMMY \\ & + \beta_{19} LN\_EMPLOYEES + FIRM\ AND\ YEAR\ FE + \epsilon_{i,t} \end{aligned}$$

In this regression, I predict that $\beta_1 > 0$ – that managers, when given greater tax avoidance incentives, will increase the quantity of personnel in the tax department. *INCENTIVE* is one of the four types of variables used to capture a specific tax avoidance incentive listed in section 3.2. For financial constraints and CEO/CFO equity risk incentives, *INCENTIVE* is measured using a financial constraint index, and the portfolio vega of the CEO or CFO, respectively. With respect to hedge fund activism (analyst cash flow forecasts), *INCENTIVE* is replaced with an indicator variable equal to one for all firm-years after the firm is first targeted by a hedge fund (receives its first cash flow forecast), and zero for all firm-years prior to the respective treatment event. For firms that have never received the treatment, *INCENTIVE* is zero for all firm-years. With the addition of firm and year fixed effects, the model effectively represents a difference-in-differences research design, where the coefficient of interest represents the average change in tax department personnel between the pre- and post-treatment periods for firms after receiving the respective treatment in year *t*, relative to firms that did not receive the treatment in year *t* (e.g. (Bertrand and Mullainathan, 2003); Armstrong et al., 2012a).

Note that, by incorporating firm fixed effects into the models, the analysis only exploits *within-firm* variation in both tax department size and incentives, thereby focusing on how the quantity of tax personnel responds to a change in incentives over time within the same firm rather than comparing tax departments between two different firms. This is done through the fixed effect structure 'de-meaning' all variables in the model such that the mean value of each variable within the firm is subtracted from the variable itself prior to its inclusion in the model (DeHaan, 2021). Year fixed effects are also included to control for time trends in tax department size, as well as mitigate potential biases with respect to changes in *LinkedIn* coverage over time. In addition, since the number of tax personnel employed by a firm is a function of characteristics not necessarily driven by tax avoidance incentives, such as the complexity of tax reporting and the volume of tax-related transactions, it is important to control for a number of firm characteristics that are potential determinants of corporate tax department size. Therefore, I include a variety of control variables.

Specifically, I include firm size (the logarithm of assets), the number of business segments, the pre-tax return on assets, the book-to-market ratio, and firm age to account for differences in the tax departments of larger, more mature, more profitable, or higher growth firms. I also include leverage, property plant & equipment, research & development expenditures, intangible assets, inventory, and SG&A expenses as these characteristics are commonly associated with a firm's tax planning opportunities and are thus likely related to

[27] Since the intentions of hedge fund activists involve influencing management through channels such as compensation incentives (e.g. Brav, Jiang and Kim 2010), it is likely necessary to control for elements of executive compensation (i.e. CEO Delta and Vega) in related analyses, which is only available for S&P 1500 firms in Execucomp.

[28] Since the focus of this analysis is on cash flow forecast firms that were treated during the sample period, I remove firms from the sample that have already received an analyst cash flow forecast prior to the year 2000.

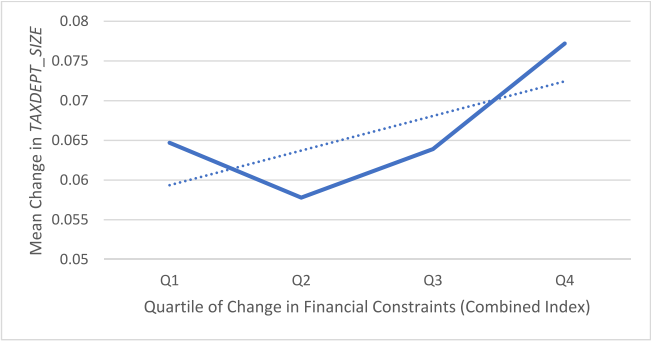

Fig. 1. Mean change in *TAXDEPT_SIZE,* partitioned by quartile of change in financial constraints.

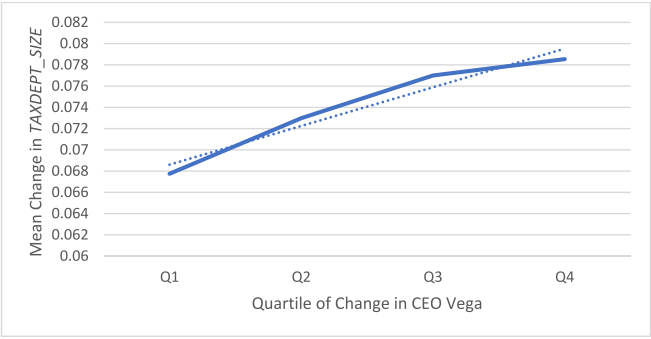

Fig. 2. Mean change in *TAXDEPT_SIZE,* partitioned by quartile of change in CEO Vega.

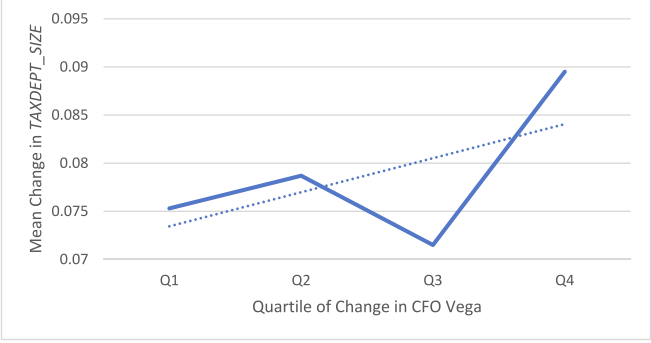

Fig. 3. Mean change in *TAXDEPT_SIZE,* partitioned by quartile of change in CFO Vega.

the number of tax personnel needed to meet tax planning objectives. I control for the firm's tax status (the existence of, and change in, net operating loss carryforwards) to account for possible differences in tax activities between firms with and without tax losses. I include variables capturing the scope of a firm's foreign operations (an indicator variable for foreign activity, the amount of foreign income, and the number of tax haven subsidiaries), as multinational firms may have larger tax departments. I also include a variable capturing the amount of tax fees paid to the firm's auditor, as tax function outsourcing may either substitute for, or complement, investments in tax department personnel. Finally, I add a control variable for the number of employees within the firm, as the relationship between tax department size and total employees is unlikely to be proportional.[29]

With respect to financial constraints and equity risk incentives, I also conduct a change analysis where the dependent variable is the change in tax department size from year *t-1* to year *t*, scaled by the number of employees in year *t-1*, and the independent variable of interest is the change in each respective *INCENTIVE* measure from year *t-1* to year *t.* All control variables in the model are also represented as changes, and industry fixed effects (using the Fama French 48 classification system) are incorporated as opposed to firm

[29] Untabulated analyses confirm a non-linear relationship between tax department size and total employees.

fixed effects.[30] As stated previously, my main regression model (through the firm fixed effects) adjusts each variable relative to the variable's mean value within the firm. In contrast, this change model adjusts each variable relative to the value of the variable in the preceding year. Therefore, while both models exploit within-firm variation, the benchmark used to adjust the variables in the model is different. Figs. 1 to 3 plot the mean change in *TAXDEPT_SIZE*, partitioned by quartiles of the change in each respective incentive measure (financial constraints, CEO and CFO equity risk incentives), across my sample. The figures generally show an increasing trend where firms with greater increases in each incentive measure experience larger expansions in their tax departments, thus providing some univariate evidence of the effectiveness of these two tax avoidance incentives.

Results

Tax department characteristics

Table 2 Panels A to D presents descriptive statistics regarding the distribution of tax department size across my sample of US public corporations. On average, firms in my sample have 8 US-based tax department employees, which is reduced to 6.4 employees after removing individuals who work outside of the income tax function according to their job titles. As expected, S&P 1500 firms have larger tax departments on average (10.35 and 8.26 employees, respectively). Panel B shows that larger firms also have larger tax departments, with firms in the highest size quartile having disproportionately large tax departments (20 US employees on average). This suggests that the right-skewedness of the tax department size distribution is driven by large firms in the sample. Tax department size also appears to be evenly distributed across industries (with the exception of the telephone/TV industry, which is driven by a few large firms such as Verizon and AT&T). Panel C lists the firms that have the largest corporate tax departments in my sample as of 2016, which includes firms known for having large tax departments such as General Electric[31] and Amazon. Finally, Panel D presents tax department characteristics for each year in my sample period, which reveals a generally increasing trend in tax department size over time.

In Panels E and F, I also provide some information on individual characteristics of tax employees within my sample, separated by seniority rank of the employee. As expected, the experience accumulated by tax employees prior to hiring is increasing in seniority rank, and the majority of tax employees' prior experience is accumulated in Big-N accounting firms and corporate tax departments, particularly among tax managers and executives. The educational level attained by an employee is also increasing in seniority rank, with the majority of tax executives having either a MTax or a law degree. Finally, Panel F shows that the most common prior employers of tax employees are all large accounting firms, and that the most common universities attended by tax employees offer well-known Master's in Taxation programs.[32]

Descriptive statistics – regression variables

Table 3 presents descriptive statistics of the variables used in the regression model to test my main hypothesis. The dependent variable (*TAXDEPT_SIZE*) represents the total number of income tax function employees in the firm, scaled by total employees (in thousands). The mean value of *TAXDEPT_SIZE* is 0.65 suggesting that, on average, 0.065 % of all employees in a firm work in the income tax function. When excluding firm-years without tax departments, this increases to 0.128 % (i.e. approximately 1 in 780 employees).

With respect to the tax avoidance incentive variables, the descriptive statistics for the four financial constraints indices and the two equity risk incentive measures are fairly similar to prior studies (e.g. (Edwards et al., 2016); (Law and Mills, 2015) ; (Rego and Wilson, 2012)). For the other two incentives, I find that over 50 % of firms have received analyst cash flow forecasts during the sample period, consistent with prior literature showing that cash flow forecasts are commonplace in recent years[33] (e.g. (Mohanram, 2014). On the other hand, only about 17 % of firms have been targeted by a hedge fund in my sample, consistent with the number of hedge fund activism events documented in prior studies (e.g. (Khurana et al., 2018) relative to the total number of firms. Note that the sample sizes differ substantially between the incentive measures, as the equity risk incentives and hedge fund activism data collection is restricted to S&P 1500 firms.

Main results

Tables 4 to 7 present the results of estimating my main regression model, which investigates the relationship between

[30] I do not incorporate firm fixed effects in this model since I am already examining within-firm analysis through the changes specification.

[31] Note that, in 2017, General Electric made an agreement with PwC to transfer the large majority of its tax employees over to the accounting firm. This included the move of 275 US-based tax employees, which is fairly close to the number of US tax employees in GE registered on LinkedIn (2 8 7). See https://www.journalofaccountancy.com/news/2017/jan/pwc-to-add-ge-tax-team-201715836.html.

[32] The top two universities attended (Golden Gate University and DePaul University) are both ranked the highest among all MS Tax programs in the United States, according to a survey of corporate tax department heads conducted by taxtalent.com. See: https://www.taxtalent.com/mstsurvey/2013_MS_Tax_Report.pdf.

[33] Since the cash flow forecast analysis excludes firms that were already treated prior to the sample period (i.e. firms that have already received a cash flow forecast before the year 2000), the actual percentage of treated firms is substantially higher.

Table 2
Corporate tax department characteristics.

Panel A: Average Tax Department Size (# of US-Based Employees)

	N	*Mean*	*Q25*	*Q50*	*Q75*
All Firm-Years with Tax Departments					
US Tax Department Size (all functions)	23,833	7.97	2	4	8
US Tax Department Size (income tax only)	23,833	6.44	1	3	7
S&P 1500 Firm-Years with Tax Departments					
US Tax Department Size (all functions)	15,094	10.35	2	5	11
US Tax Department Size (income tax only)	15,094	8.26	2	4	9

Panel B: Tax Department Size by Firm Size and Industry

Size Quartile (Total Assets)	*N*	*Mean*	*Q25*	*Q50*	*Q75*
1	5,959	2.12	1	1	3
2	5,958	3.56	2	3	5
3	5,958	6.06	3	5	8
4	5,958	20.15	7	13	24

Industry (Fama French 12 Classification)	*N*	*Mean*	*Q25*	*Q50*	*Q75*
Consumer Non-Durables (Food etc.)	1,713	7.49	2	4	9
Consumer Durables (Cars, TVs, etc.)	906	6.30	2	4	6
Manufacturing	3,611	6.45	2	3	7
Oil, Gas and Coal	1,256	9.96	2	4	10
Chemicals and Allied Products	963	8.58	2	6	12
Business Equipment (Computers etc.)	5,478	7.33	1	3	7
Telephone and TV Transmission	869	16.88	2	4	15
Wholesale, Retail and Services	3,853	8.80	2	4	10
Healthcare and Medical Equipment	1,723	7.36	1	3	8
Other	3,537	7.41	2	3	8

Panel C: Largest US-Based Corporate Tax Departments in Sample (2016)

Rank	Company	# US Tax Employees on *LinkedIn*
1	General Electric	287
2	Amazon.com	249
3	Oracle	184
4	Verizon Communications	176
5	AT&T	170
Rank	Company	# US Tax Employees on *LinkedIn*
6	IBM	140
7	Walmart	125
8	Exxon Mobil	120
9	United Technologies	107
10	Johnson & Johnson	105

Panel D: Tax Department Size by Year

Year	***N***	**% of firms with tax departments**	**Mean US tax department size (among firms with tax departments)**
2000	2,731	43.2%	6.34
2001	2,875	42.9%	6.36
2002	3,007	43.6%	6.36
2003	2,936	45.8%	6.96
2004	2,909	48.8%	7.18
2005	2,890	49.7%	7.21
2006	2,848	50.8%	7.60
2007	2,777	51.5%	7.97
2008	2,691	50.6%	7.64
2009	2,622	50.2%	7.62
2010	2,525	52.2%	8.12
2011	2,414	54.2%	8.64
2012	2,368	55.2%	9.06
2013	2,364	56.1%	9.16
2014	2,344	56.5%	9.18
2015	2,289	57.3%	9.24
2016	2,133	57.8%	9.39
2017	2,139	57.2%	9.53

Panel E: Income Tax Employee Characteristics

	Analyst Rank *N = 14,450*	Manager Rank *N = 9,450*	Executive Rank *N = 7,222*
Prior Work Experience (Before Joining Firm):			
Average Number of Years Worked:	4.59	9.92	14.19

(*continued on next page*)

Table 2 (*continued*)

Panel E: Income Tax Employee Characteristics			
As a Manager:	0.60	4.67	6.53
As an Executive:	0.04	0.66	4.98
% of Employees with Experience in			
Big N Accounting Firm:	25.6%	65.9%	77.4%
Non-Big N Accounting/Consulting Firm:	22.7%	27.1%	17.7%
Financial Institution:	11.5%	14.0%	14.2%
Law Firm:	1.8%	4.6%	11.5%
Government Agency (e.g. IRS):	2.5%	3.4%	3.7%
Public Corporation (Tax Department):	22.0%	41.7%	52.5%
Private Corporation (Tax Department):	9.2%	17.5%	21.7%
Educational Background			
% of Employees whose Highest Attained Education is			
Undergraduate Degree:	46.6%	32.7%	22.2%
Undergraduate in Accounting:	35.9%	28.0%	20.1%
Graduate Degree:	52.2%	67.0%	77.3%
MTax or MAcc with Tax Specialization:	20.5%	36.5%	37.7%
Other MAcc:	18.2%	13.4%	8.9%
Law Degree (JB or LLM):	3.2%	11.0%	28.0%
Attended a Top 20 Business School[47]:	4.7%	11.0%	20.8%
Other Characteristics			
Average Age (while employed in company):	32.4	38.4	44.0
Gender (% Female):	47.7%	39.2%	26.1%
Average Tenure (# of Years):	3.72	5.06	6.45

Rank	Educational Institution	% Tax Employees
1	Golden Gate University	2.8%
2	DePaul University	2.1%
3	Univ. of Texas at Austin	2.0%
4	New York University	1.9%
5	University of Washington	1.8%
6	Bentley University	1.8%
7	University of Houston	1.6%
8	UIUC	1.5%

Panel F: Most Common Prior Employers and Educational Institutions

Rank	Prior Employer	% Tax Employees
1	PricewaterhouseCoopers	14.1%
2	Ernst & Young	11.2%
3	Deloitte	10.9%
4	KPMG	8.8%
5	Arthur Andersen	4.9%
6	Grant Thornton	2.5%
7	RSM/McGladrey	1.3%
8	BDO	1.3%

[47]Business school rankings are obtained from the US News 'Best Business Schools' (https://www.usnews.com/best-graduate-schools/top-business-schools/mba-rankings).

TAXDEPT_SIZE and each of the four tax avoidance incentives examined in this study. Table 4 presents the results of the regression using financial constraints as the measure of tax avoidance incentives. I standardize the level and change of each financial constraints index to have a mean of 0 and a standard deviation of 1 for ease of interpretation. Panel A presents my main results with the firm fixed effect structure, and Panel B presents results when a change analysis is conducted instead. Columns (1) to (4) display the results for each individual financial constraint index examined in this study, and Column (5) presents the results using the combined financial constraints index, constructed using Principal Components Analysis.

In Panel A, I find a significantly positive relationship between financial constraints and tax department size using three of the four financial constraint indices, as well as the combined measure, suggesting that managers make greater investments in the tax department when their firms are financially constrained. The only insignificant measure is the Whited-Wu Index in Column (3), which has a positive effect on tax department size with a similar magnitude as the other indices, but is not statistically significant at the conventional levels. To gauge economic magnitude, I use the coefficient on the combined index to estimate that a one-standard deviation in financial constraints is associated with a 0.048 unit increase in *TAXDEPT_SIZE*, representing a 7.4 % increase in the quantity

Table 3
Descriptive Statistics: Regression Variables.

	N	*Mean*	*SD*	*Q25*	*Q50*	*Q75*
Main Variables						
TAXDEPT_SIZE	46,862	0.650	1.352	0.000	0.045	0.677
Financial Constraints:						
Altman Z-Score	45,800	−4.172	5.388	−5.360	−3.227	−1.728
KZ Index	46,700	−8.770	27.663	−6.556	−1.245	0.825
WW Index	46,427	−0.275	0.106	−0.349	−0.271	−0.198
Textual	38,348	0.016	0.004	0.014	0.016	0.019
Combined Index	37,225	−0.074	0.816	−0.522	−0.066	0.396
Equity Risk Incentives:						
CEO Vega ($M)	16,251	0.138	0.226	0.015	0.054	0.157
CFO Vega ($M)	13,404	0.033	0.053	0.004	0.014	0.038
Analyst Cash Flow Forecasts:						
Post Cash Flow Forecast	40,121	0.432	0.495	0.000	0.000	1.000
% of Firms Treated	40,121	50.4 %				
Hedge Fund Intervention:						
Post Hedge Fund	16,606	0.119	0.324	0.000	0.000	0.000
% of Firms Treated	16,606	17.4 %				
Control Variables						
SIZE	46,862	6.072	1.956	4.588	6.009	7.431
LN_SEGMENTS	46,862	1.079	0.433	0.693	0.693	1.386
ROA	46,862	0.029	0.192	−0.028	0.053	0.123
BTM	46,862	0.568	0.980	0.256	0.468	0.793
FIRM_AGE	46,862	20.576	15.544	8.000	16.000	29.000
LEVERAGE	46,862	0.222	0.221	0.017	0.181	0.345
PPE	46,862	0.248	0.223	0.076	0.174	0.353
R&D	46,862	0.041	0.075	0.000	0.000	0.052
INTANG	46,862	0.178	0.196	0.011	0.106	0.291
INVENTORY	46,862	0.126	0.138	0.010	0.088	0.190
NOL	46,862	0.499	0.500	0.000	0.000	1.000
CHANGE_NOL	46,862	0.035	0.189	0.000	0.000	0.009
FOR_DUMMY	46,862	0.598	0.490	0.000	1.000	1.000
FOR_INCOME	46,862	0.012	0.030	0.000	0.000	0.014
LN_HAVENS	46,862	0.635	0.975	0.000	0.000	1.099
TAX_FEES	46,862	2.825	2.635	0.000	3.091	5.087
LN_EMPLOYEES	46,862	0.461	1.983	−0.994	0.469	1.863
SG&A	46,862	0.330	0.283	0.130	0.256	0.441
CEO_DELTA ($M)	16,251	0.621	1.323	0.081	0.212	0.566
CEO_AGE	16,251	55.397	7.249	50.000	55.000	60.000
CFO_DELTA ($M)	13,404	0.080	0.120	0.015	0.038	0.092
CFO_AGE	13,404	50.335	6.596	46.000	50.000	55.000
LN_ANALYSTS	46,862	1.847	1.189	0.693	2.079	2.773
TOTAL_FEES	42,740	13.614	1.437	12.626	13.651	14.537
	N	*Mean*	*SD*	*Q25*	*Q50*	*Q75*
Variables in Additional Tests						
JUNIOR	46,862	0.189	0.518	0.000	0.000	0.118
SENIOR	46,862	0.439	0.952	0.000	0.000	0.425
ACTG FIRM	46,862	0.115	0.352	0.000	0.000	0.024
TAX DEPT	46,862	0.209	0.548	0.000	0.000	0.115
COMPL	46,862	0.040	0.168	0.000	0.000	0.000
NON-COMPL	46,862	0.359	4.529	0.000	0.000	0.184

Note: This table presents the descriptive statistics – including mean, standard deviation, and the 25th, 50th, and 75th percentiles for all dependent, independent, and control variables that appear in the subsequent regression models.

of tax personnel for the average firm. In terms of dollar value, I estimate that the average firm would spend $70,102 on additional tax department personnel per year corresponding to a one standard deviation increase in financial constraints.[34] When using the change analysis, I find similar results qualitatively. In Panel B, I find that changes in financial constraints are significantly and positively associated with changes in tax department personnel for two of the four financial constraint indices as well as the combined index. Overall, these results provide evidence consistent with Hypothesis 1.

[34] In my sample, the mean value of *EMP* is 10.85 (i.e. 10,850 employees) and thus a 0.048 unit change in *TAXDEPT_SIZE* corresponds to an increase of 0.521 tax employes for the average firm. The salary of an average tax manager (which is the median rank of tax employees within a tax department) is $134,604 as of June 2023 according to salary.com. Therefore, the compensation increase for the average firm would be $134,604 x 0.521 = $70,102. I note that this may be an under-estimate, since there are additional costs of hiring and retaining an employee above the salary paid, such as benefits.

Table 4
The Relationship Between Financial Constraints and Tax Department Size.

Panel A: Levels Specification

	(1)	(2)	(3)	(4)	(5)
CONSTRAINT =	Altman Z-Score	KZ Index	WW Index	Textual	Combined
CONSTRAINT	0.028**	0.027**	0.032	0.014*	0.048***
	(2.075)	(2.443)	(1.309)	(1.696)	(3.924)
SIZE	0.214***	0.214***	0.216***	0.191***	0.203***
	(5.059)	(5.188)	(5.058)	(3.949)	(4.222)
LN_SEGMENTS	−0.083**	−0.076**	−0.076**	−0.053	−0.056
	(−2.192)	(−2.034)	(−2.008)	(−1.364)	(−1.426)
ROA	−0.049	−0.073	−0.095*	−0.137**	−0.070
	(−0.861)	(−1.359)	(−1.649)	(−2.330)	(−1.083)
BTM	−0.006	−0.004	−0.002	−0.006	−0.007
	(−0.845)	(−0.628)	(−0.365)	(−0.856)	(−0.979)
FIRM_AGE	−0.004	0.006	0.007	−0.058	−0.049
	(−0.132)	(0.242)	(0.248)	(−1.254)	(−0.990)
LEVERAGE	0.063	0.101	0.091	0.054	−0.005
	(0.909)	(1.547)	(1.383)	(0.712)	(−0.065)
PPE	0.268*	0.312**	0.380***	0.268	0.258
	(1.801)	(2.134)	(2.681)	(1.612)	(1.570)
RD	−0.856***	−0.889***	−0.919***	−0.919***	−0.926***
	(−3.757)	(−3.859)	(−3.933)	(−3.489)	(−3.431)
INTANG	−0.228***	−0.209**	−0.154*	−0.187**	−0.196**
	(−2.749)	(−2.574)	(−1.915)	(−1.973)	(−2.098)
INVENTORY	0.051	0.006	0.022	0.024	0.008
	(0.287)	(0.036)	(0.127)	(0.122)	(0.041)
NOL	0.045**	0.036**	0.036*	0.028	0.033*
	(2.409)	(1.964)	(1.929)	(1.450)	(1.759)
CHANGE_NOL	−0.011	−0.013	−0.025	−0.047	−0.040
	(−0.406)	(−0.452)	(−0.858)	(−1.559)	(−1.319)
FOR_DUMMY	0.095***	0.098***	0.098***	0.118***	0.111***
	(3.186)	(3.234)	(3.277)	(3.662)	(3.521)
FOR_INCOME	−0.311	−0.285	−0.205	−0.002	0.033
	(−0.998)	(−0.920)	(−0.670)	(−0.006)	(0.103)
LN_HAVENS	0.017	0.015	0.015	0.013	0.010
	(1.124)	(0.992)	(1.038)	(0.825)	(0.677)
TAX_FEES	0.002	0.002	0.002	0.001	−0.000
	(0.603)	(0.580)	(0.600)	(0.253)	(−0.136)
LN_EMPLOYEES	−0.401***	−0.419***	−0.405***	−0.408***	−0.394***
	(−8.883)	(−9.497)	(−9.427)	(−7.640)	(−8.033)
SGA	0.046	0.039	0.053	0.057	0.074
	(0.802)	(0.648)	(0.875)	(0.852)	(1.012)
Observations	45,800	46,700	46,427	38,348	37,225
R-squared	0.080	0.083	0.082	0.081	0.081
Firm and Year FEs	YES	YES	YES	YES	YES

Panel B: Changes Specification

	(1)	(2)	(3)	(4)	(5)
CONSTRAINT =	Altman Z-Score	KZ Index	WW Index	Textual	Combined
ΔCONSTRAINT	0.009***	0.011***	−0.000	0.001	0.011***
	(3.431)	(2.908)	(−0.064)	(0.383)	(3.962)
ΔSIZE	0.079***	0.081***	0.075***	0.089***	0.102***
	(6.003)	(6.267)	(5.303)	(5.803)	(6.354)
ΔLN_SEGMENTS	−0.013	−0.013	−0.009	−0.006	0.000
	(−0.832)	(−0.789)	(−0.551)	(−0.320)	(0.015)
ΔROA	−0.032*	−0.041**	−0.053***	−0.056***	−0.037*
	(−1.693)	(−2.233)	(−2.666)	(−2.773)	(−1.677)
ΔBTM	−0.001	0.001	0.001	−0.001	−0.003
	(−0.305)	(0.233)	(0.315)	(−0.430)	(−1.039)
ΔFIRM_AGE	0.021*	0.019	0.017	0.002	0.003
	(1.779)	(1.628)	(1.417)	(0.116)	(0.157)
ΔLEVERAGE	−0.076***	−0.055**	−0.048*	−0.059*	−0.069**
	(−2.791)	(−2.097)	(−1.819)	(−1.898)	(−2.187)
ΔPPE	0.181***	0.187***	0.197***	0.201***	0.219***
	(3.343)	(3.481)	(3.598)	(3.175)	(3.338)
ΔRD	−0.228*	−0.213	−0.196	−0.216	−0.170
	(−1.667)	(−1.547)	(−1.390)	(−1.377)	(−1.059)
ΔINTANG	0.006	0.012	0.025	−0.017	−0.024
	(0.147)	(0.319)	(0.635)	(−0.370)	(−0.533)
ΔINVENTORY	0.055	0.045	0.061	0.031	0.048

(*continued on next page*)

Table 4 (*continued*)

Panel B: Changes Specification					
	(1.003)	(0.814)	(1.104)	(0.493)	(0.759)
ΔNOL	0.009	0.008	0.008	0.002	0.002
	(1.197)	(1.087)	(1.167)	(0.265)	(0.234)
ΔCHANGE_NOL	0.022**	0.023**	0.022**	0.026**	0.024*
	(2.114)	(2.116)	(2.010)	(2.101)	(1.904)
ΔFOR_DUMMY	−0.003	−0.003	−0.004	−0.004	−0.007
	(−0.360)	(−0.334)	(−0.478)	(−0.435)	(−0.761)
ΔFOR_INCOME	−0.005	0.002	0.013	0.041	0.068
	(−0.040)	(0.015)	(0.112)	(0.311)	(0.513)
ΔLN_HAVENS	0.015*	0.014*	0.015*	0.011	0.013
	(1.889)	(1.808)	(1.888)	(1.338)	(1.579)
ΔTAX_FEES	0.002	0.002	0.002	0.002	0.002
	(1.605)	(1.564)	(1.592)	(1.253)	(1.249)
ΔLN_EMPLOYEES	0.118***	0.118***	0.123***	0.123***	0.119***
	(9.352)	(9.485)	(9.751)	(8.372)	(7.967)
ΔSGA	−0.052**	−0.052**	−0.076***	−0.050*	−0.054*
	(−2.134)	(−2.090)	(−2.889)	(−1.767)	(−1.777)
Observations	39,949	40,728	40,501	32,541	31,592
R-squared	0.023	0.024	0.024	0.024	0.025
Industry and Year FEs	YES	YES	YES	YES	YES

Note: This table presents the results of estimating OLS Regressions of tax department size (scaled by number of employees) on various financial constraint measures. All variables are calculated as described in Appendix A. Variables are winsorized at the 1st and 99th percentiles. Standard errors are robust and clustered by firm. T-statistics are presented in parantheses. *, **, and *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively.

Note: This table presents the results of estimating OLS Regressions of changes in tax department size, scaled by the lagged number of employees, on changes in financial constraint measures. All variables are calculated as described in Appendix A. Variables are winsorized at the 1st and 99th percentiles. Standard errors are robust and clustered by firm. T-statistics are presented in parantheses. *, **, and *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively.

Table 5 uses the equity risk incentives of the CEO and CFO as the measures of tax avoidance incentives. Panel A presents the main results and Panel B presents results with the change analysis. The level and changes of the incentive measures are standardized. In addition to the control variables in main regression model, I also control for the pay-for-performance sensitivity[35] (i.e. the 'delta') and the age of the executive similar to (Rego and Wilson, 2012). In Panel A, I find that for both the CEO and CFO, there is a significantly positive relationship between their portfolio vega (the sensitivity of their portfolio wealth to firm risk) and tax department size, indicating that managers increase tax department investments when given risk-taking incentives through equity compensation. A one-standard deviation increase in the CEO's (CFO's) equity risk incentives is associated with an increase in *TAXDEPT_SIZE* of 0.036 and 0.032, respectively, representing a 5.8 % (5.9 %) increase in the quantity of tax department personnel for the average firm. In terms of dollar values, a one-standard deviation increase in CEO (CFO) risk incentives corresponds to $52,576 ($46,735) of additional spending on tax employees per year.[36] Panel B presents consistent results with the change analysis, as increases in both the CEO and CFO's equity risk incentives relative to the preceding year are associated with corresponding increases in tax department investments. In summary, these results provide further evidence consistent with Hypothesis 1.

Tables 6 and 7 investigate the change in tax personnel following a hedge fund intervention or an analyst cash flow forecast, respectively, using a difference-in-differences design with untreated firms (i.e. firms not experiencing the event) as the control group. Table 6 focuses on hedge fund interventions, where the variable of interest, *Post Intervention,* equals 1 for all firm-years after a firm experiences a hedge fund intervention, and 0 otherwise. In addition to the common control variables, I also include CEO vega and delta as additional controls as prior studies show that hedge funds can influence CEO compensation (e.g. (Brav et al., 2010). Column 1 shows a significantly positive relationship between tax department size and *Post Hedge Fund*, suggesting that managers increase tax department investments after being targeted by a hedge fund. On average, firms experience an increase in *TAXDEPT_SIZE* of 0.106 after the hedge fund intervention, representing a 16.3 % increase for the average firm, relative to firms that do not receive the intervention in the same period. In terms of dollar value, this corresponds to an increase of $154,808 per year in tax department salaries.[37]

However, one concern with the above specification is that, since I use all firms that were not subject to the hedge fund treatment as the control group, the results may be biased if there are fundamental differences between firms that become targets of hedge fund

[35] While I do not make a formal prediction, it is noteworthy that the coefficients on both *CEO DELTA* and *CFO DELTA* are significantly negative, suggesting that managers make less investments in the tax department when their portfolio is more sensitive to the firm's stock price. This is consistent with (DeHaan, 2021), who find a negative relation between incentive compensation and tax sheltering.

[36] These are computed by taking the increase in *TAXDEPT_SIZE* (0.036 and 0.032) multiplied by the average employee size (10.85) and then multiplied by the average salary per tax manager ($134,604).

[37] This is computed as 0.106 x 10.85 (average *EMP* value in thousands) x $134,604 (average tax manager salary).

Table 5
The Relationship Between Executive Risk Incentives and Tax Department Size.

Panel A: Levels Specification		
	(1)	(2)
EXEC =	CEO	CFO
EXEC_VEGA	0.036***	0.032**
	(2.605)	(2.120)
SIZE	0.245***	0.268***
	(3.256)	(3.155)
LN_SEGMENTS	−0.113**	−0.136**
	(−2.173)	(−2.334)
ROA	−0.215	−0.202
	(−1.458)	(−1.153)
BTM	−0.033	−0.020
	(−1.437)	(−0.927)
FIRM_AGE	−0.425	−0.481
	(−1.492)	(−1.289)
LEVERAGE	−0.155	−0.096
	(−1.174)	(−0.743)
PPE	0.417*	0.360
	(1.797)	(1.443)
RD	−0.616	−0.578
	(−1.345)	(−1.066)
INTANG	−0.122	−0.160
	(−0.973)	(−1.137)
INVENTORY	0.108	0.462
	(0.303)	(1.225)
NOL	0.019	0.003
	(0.738)	(0.104)
CHANGE_NOL	−0.091	−0.132*
	(−1.179)	(−1.722)
FOR_DUMMY	0.021	0.076*
	(0.530)	(1.666)
FOR_INCOME	0.210	−0.021
	(0.364)	(−0.036)
LN_HAVENS	0.022	0.025
	(1.299)	(1.328)
TAX_FEES	−0.002	−0.001
	(−0.412)	(−0.276)
LN_EMPLOYEES	−0.686***	−0.744***
	(−7.856)	(−6.870)
SGA	−0.014	0.049
	(−0.086)	(0.268)
EXEC_DELTA	−0.022**	−0.315**
	(−2.069)	(−2.350)
EXEC_AGE	−0.001	0.001
	(−0.374)	(0.493)
Observations	16,251	13,404
R-squared	0.157	0.147
Firm and Year FEs	YES	YES
Panel B: Changes Specification		
	(1)	(2)
EXEC =	CEO	CFO
ΔEXEC_VEGA	0.004*	0.007***
	(1.757)	(2.636)
ΔSIZE	0.079**	0.072*
	(2.435)	(1.935)
ΔLN_SEGMENTS	0.009	−0.011
	(0.371)	(−0.370)
ΔROA	−0.162***	−0.189***
	(−3.589)	(−3.608)
ΔBTM	0.001	−0.002
	(0.176)	(−0.200)
ΔFIRM_AGE	−0.323	0.022
	(−1.573)	(0.319)
ΔLEVERAGE	−0.115*	−0.126*
	(−1.952)	(−1.849)
ΔPPE	0.072	0.189
	(0.570)	(1.208)
ΔRD	0.021	−0.123

(*continued on next page*)

Table 5 (*continued*)

Panel B: Changes Specification		
	(0.063)	(−0.296)
ΔINTANG	−0.005	0.043
	(−0.063)	(0.429)
ΔINVENTORY	−0.030	0.034
	(−0.194)	(0.189)
ΔNOL	0.003	−0.014
	(0.234)	(−1.078)
ΔCHANGE_NOL	0.016	−0.018
	(0.517)	(−0.520)
ΔFOR_DUMMY	0.001	0.012
	(0.036)	(0.597)
ΔFOR_INCOME	0.177	0.425*
	(0.801)	(1.648)
ΔLN_HAVENS	0.013	0.018
	(1.258)	(1.412)
ΔTAX_FEES	0.004**	0.003
	(2.155)	(1.114)
ΔLN_EMPLOYEES	0.177***	0.183***
	(6.265)	(5.302)
ΔSGA	−0.067	−0.032
	(−0.943)	(−0.428)
ΔEXEC_DELTA	0.003	−0.020
	(0.422)	(−0.340)
ΔEXEC_AGE	0.001	−0.001
	(1.493)	(−0.924)
Observations	13,653	11,106
R-squared	0.035	0.034
Industry and Year FEs	YES	YES

Note: This table presents the results of estimating OLS Regressions of tax department size (scaled by number of employees) on portfolio vegas of the CEO and CFO. All variables are calculated as described in Appendix A. Variables are winsorized at the 1st and 99th percentiles. Standard errors are robust and clustered by firm. T-statistics are presented in parantheses. *, **, and *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively.

Note: This table presents the results of estimating OLS Regressions of changes in tax department size, scaled by the lagged number of employees, on changes in CEO and CFO portfolio vegas. All variables are calculated as described in Appendix A. Variables are winsorized at the 1st and 99th percentiles. Standard errors are robust and clustered by firm. T-statistics are presented in parantheses. *, **, and *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively.

interventions and firms that do not. To account for this, I employ entropy balancing (Hainmueller, 2012) to weigh observations in the control group in order to achieve covariate balance with respect to the main control variables.[38] Observations are weighted to achieve balance in the first, second and third moments of the distribution with respect to each variable. Intuitively, this creates a control group of non-hedge fund targets that are identical to the treatment group in terms of the distribution of observable firm characteristics, with the exception that they were not subject to the hedge fund intervention. Column (2) repeats the analyses using the entropy-balanced sample, and the results are consistent, suggesting that differences between the treatment and control groups with respect to observable firm characteristics do not weaken my results.

Finally, Table 7 focuses on the cash flow forecast treatment event, where *POST FORECAST* equals 1 for all firm-years after the firm receives its first analyst cash flow forecast. Column (1) shows a significantly positive relationship between tax department size and *POST FORECAST*, indicating that managers increase tax personnel quantity after analysts begin issuing cash flow forecasts for the firm. Relative to untreated firms, firms experience a 0.138 increase in *TAXDEPT_SIZE* after receiving cash flow forecasts, representing a 21 % increase for the average firm. Column (2) repeats this analysis after conducting entropy balancing, where control firms without cash flow forecasts are re-weighed in the sample to achieve covariate balance with firms that receive cash flow forecasts. Using the entropy-balanced sample, I continue to observe a statistically significant effect of cash flow forecasts on the quantity of tax department personnel. The economic magnitude is weaker, however, with the average firm experiencing a 13.5 % increase in *TAXDEPT_SIZE* following the initiation of cash flow forecasts. This corresponds to an increase of $128,520 in tax department salaries per year.[39]

Overall, these results provide support for Hypothesis 1 – that managers respond to tax avoidance incentives by increasing personnel hiring in the firm's tax department. Each of the four incentives are significantly and positively associated with the quantity of tax department personnel, after controlling for many other determinants of tax department size and focusing only on within-firm variation through either firm fixed effects or a change analysis. These results suggest that tax avoidance incentives induce managers to focus on the tax function and allocate resources towards employing tax personnel.

[38] These control variables also include year fixed effects and industry fixed effects, such that the treatment and control groups are also identical with respect to both industry composition and time period.

[39] This is computed as 0.088 x 10.85 (average *EMP* value in thousands) x $134,604 (average tax manager salary).

Table 6
Tax Department Size Following Hedge Fund Intervention.

	(1)	(2)
Sample	Full Sample	Entropy-Balanced Sample
POST INTERVENTION	0.106*	0.115**
	(1.872)	(1.983)
SIZE	0.241***	0.248**
	(3.297)	(2.246)
LN_SEGMENTS	−0.121**	−0.101
	(−2.323)	(−1.320)
ROA	−0.203	0.051
	(−1.431)	(0.219)
BTM	−0.028	−0.027
	(−1.277)	(−1.088)
FIRM_AGE	−0.431	−0.567**
	(−1.509)	(−2.025)
LEVERAGE	−0.143	−0.028
	(−1.086)	(−0.161)
PPE	0.430*	0.401
	(1.867)	(1.310)
RD	−0.527	−0.275
	(−1.177)	(−0.426)
INTANG	−0.141	−0.018
	(−1.110)	(−0.099)
INVENTORY	0.047	0.192
	(0.134)	(0.348)
NOL	0.019	0.029
	(0.739)	(0.752)
CHANGE_NOL	−0.078	−0.057
	(−1.019)	(−0.605)
FOR_DUMMY	0.017	0.038
	(0.445)	(0.677)
FOR_INCOME	0.224	−0.027
	(0.393)	(−0.039)
LN_HAVENS	0.022	0.012
	(1.305)	(0.463)
TAX_FEES	−0.002	−0.003
	(−0.485)	(−0.504)
LN_EMPLOYEES	−0.663***	−0.768***
	(−7.746)	(−5.830)
SGA	−0.031	−0.160
	(−0.197)	(−0.837)
CEO_VEGA	0.145**	0.183
	(2.406)	(1.382)
CEO_DELTA	−0.022**	−0.033
	(−2.174)	(−1.540)
Observations	16,606	16,606
R-squared	0.157	0.168
Firm and Year FEs	YES	YES

Note: This table presents the results of estimating Difference-in-Differences Regressions of tax department size (scaled by number of employees), using hedge fund interventions as the treatment event. All variables are calculated as described in Appendix A. Variables are winsorized at the 1st and 99th percentiles. Standard errors are robust and clustered by firm. T-statistics are presented in parentheses. *, **, and *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively.

Tax employee heterogeneity

While the neo-classical view of the firm suggests that employees are merely homogenous inputs into the firm's production process, many economics studies have rejected this view in favor of the theory that employees are heterogeneous and can play a role in determining firm productivity (e.g. Black and Lynch, 1996, Haltiwanger et al., 1999). In this context, employees hired within the tax department accumulate different types of work experience (see Table 2, Panel D), and prior tax studies (Barrios and Gallemore, 2023) suggest that employers of tax personnel do consider prior work experience in making hiring decisions. Therefore, the types of tax employees that managers employ when provided with tax avoidance incentives may vary as well. In this section, I empirically examine this heterogeneity in hiring in response to incentives.

Table 7
Tax Department Size following Cash Flow Forecast Initiation.

	(1)	(2)
VARIABLES	Full Sample	Entropy-Balanced Sample
POST FORECAST	0.138***	0.088**
	(4.513)	(2.109)
SIZE	0.114***	0.135**
	(2.821)	(2.269)
LN_SEGMENTS	−0.049	−0.054
	(−1.263)	(−1.007)
ROA	−0.075	−0.120
	(−1.360)	(−1.541)
BTM	0.000	−0.004
	(0.009)	(−0.285)
FIRM_AGE	0.010	0.037
	(0.412)	(1.525)
LEVERAGE	0.111	0.056
	(1.642)	(0.429)
PPE	0.098	0.219
	(0.702)	(1.077)
RD	−0.884***	−0.897***
	(−3.708)	(−2.710)
INTANG	−0.117	−0.165
	(−1.387)	(−1.347)
INVENTORY	−0.092	−0.202
	(−0.509)	(−0.610)
NOL	0.032*	0.073**
	(1.666)	(2.423)
CHANGE_NOL	−0.006	−0.000
	(−0.193)	(−0.001)
FOR_DUMMY	0.119***	0.114**
	(3.722)	(2.110)
FOR_INCOME	0.022	−0.019
	(0.070)	(−0.054)
LN_HAVENS	0.029*	0.063**
	(1.719)	(1.999)
TAX_FEES	0.002	0.002
	(0.686)	(0.300)
LN_EMPLOYEES	−0.326***	−0.394***
	(−7.173)	(−6.435)
SGA	−0.001	−0.043
	(−0.024)	(−0.520)
LN_ANALYSTS	0.013	0.025
	(0.751)	(1.069)
Observations	40,121	40,121
R-squared	0.070	0.102
Firm and Year FEs	YES	YES

Note: This table presents the results of estimating Difference-in-Differences Regressions of tax department size (scaled by number of employees), using analyst cash flow forecast initiation as the treatment event. All variables are calculated as described in Appendix A. Variables are winsorized at the 1st and 99th percentiles. Standard errors are robust and clustered by firm. T-statistics are presented in parentheses. *, **, and *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively.

First, I examine whether the increases in tax personnel are concentrated among junior or senior tax employees. While junior tax employees (e.g. analysts and accountants), due to possessing relatively fewer tax planning skills on average, mainly focus on compliance roles such as tax return preparation, data analysis or tax audit assistance, senior tax employees (e.g. managers and directors) may play an active role in the firm's tax planning given a more developed skillset.[40] Therefore, managers may respond to tax avoidance incentives by allocating resources towards hiring senior tax employees specifically. I examine this possibility by partitioning *TAXDEPT_SIZE* by seniority and estimating two separate regressions for each tax avoidance incentive, replacing the dependent variable with the number of junior (senior) tax employees in the first (second) regression. Table 8 presents the results, which provide support for this prediction. With the exception of analyst cash flow forecasts, the relationship between tax avoidance incentives and tax personnel hiring is only significant when considering the quantity of senior tax employees employed within the firm, lending support to the hypothesis that managers will hire employees with tax planning responsibilities when provided with tax avoidance incentives.

Within the group of senior tax employees, there remains substantial heterogeneity with respect to work experience, and managers

[40] A search of job descriptions of several job postings for junior and senior tax positions confirms that senior tax employees are often responsible for tax planning activities, as well as the consequences of these activities such as managing IRS tax audits.

Table 8
The Relationship Between Tax Avoidance Incentives and Tax Department Size - Junior vs. Senior Employees.

Panel A: Financial Constraints (Combined Measure)

	(1)	(2)
Type of Employee	JUNIOR	SENIOR
INCENTIVE	0.007	0.040***
	(1.645)	(4.113)
Observations	37,225	37,225
R-squared	0.045	0.059
Controls & FEs	YES	YES

Panel B: Equity Risk Incentives

	(1)	(2)	(3)	(4)
INCENTIVE =	CEO Vega		CFO Vega	
Type of Employee	JUNIOR	SENIOR	JUNIOR	SENIOR
INCENTIVE	0.009	0.026***	0.011	0.022**
	(1.479)	(2.627)	(1.504)	(2.186)
Observations	16,251	16,251	13,404	13,404
R-squared	0.088	0.112	0.082	0.106
Controls & FEs	YES	YES	YES	YES

Panel C: Hedge Fund Intervention

	(1)	(2)
Type of Employee	JUNIOR	SENIOR
INCENTIVE	0.009	0.088**
	(0.386)	(2.147)
Observations	16,606	16,606
R-squared	0.088	0.113
Controls & FEs	YES	YES

Panel D: Analyst Cash Flow Forecasts

	(1)	(2)
VARIABLES	JUNIOR	SENIOR
INCENTIVE	0.035***	0.101***
	(2.772)	(4.516)
Observations	40,121	40,121
R-squared	0.041	0.051
Controls & FEs	YES	YES

Note: This table presents the results of estimating OLS Regressions of the number of junior and senior employees in the firm's tax department, scaled by total employees, on a set of tax avoidance incentives, where seniority is assigned based on job title. All variables are calculated as described in Appendix A. Robust standard errors are clustered by firm. T-statistics are presented in parentheses. *, **, and *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively.

may respond to tax avoidance incentives by hiring employees who are best suited to support tax planning activities given their backgrounds. Specifically, employees who have previously worked in a tax department may be more familiar with corporate tax planning relative to employees with only public accounting experience, and employers generally seek knowledge obtained from working in tax departments of similar corporations as opposed to experience obtained in public accounting firms, which may be less specific to the corporation's needs (e.g. (Barrios and Gallemore, 2023). This is also consistent with prior literature which finds that external auditors are less aggressive in tax planning than corporate tax departments (Klassen et al., 2016). Therefore, managers with tax avoidance incentives may prefer hiring employees with prior tax department experience. To test this, I estimate two regressions for each incentive, using the number of senior tax employees with prior public accounting firm experience (tax department experience[41]) as the dependent variable in the first (second) regression. I find some support for this prediction in Table 9. With the exception of analyst cash flow forecasts, tax avoidance incentives are only significantly associated with tax personnel hiring for employees with prior tax department experience.

Finally, as a falsification test, I examine whether managers, in response to tax avoidance incentives, are also more likely to hire senior tax employees who are primarily engaged in tax compliance tasks. As discussed earlier, tax department employees have two major roles – to develop and implement tax planning strategies for the firm and to ensure compliance with the necessary tax filing requirements and financial reporting standards (e.g. preparing tax provisions). When faced with a tax avoidance incentive, managers would likely not be interested in hiring tax employees whose skillsets primarily support the compliance role, as the managers' objective is to reduce the corporation's tax liability. To empirically investigate this prediction, I extract the skills listed in the *LinkedIn*

[41] Employees who have both accounting firm experience and tax department experience would be classified into the tax department category.

Table 9
The Relationship Between Tax Avoidance Incentives and Tax Department Size – Employees with Prior Accounting Firm Experience vs. Tax Department Experience.

Panel A: Financial Constraints (Combined Measure)

	(1)	(2)
Type of Employee	ACTG FIRM	TAX DEPT
INCENTIVE	0.006	0.025***
	(1.600)	(4.475)
Observations	37,225	37,225
R-squared	0.020	0.050
Controls & FEs	YES	YES

Panel B: Equity Risk Incentives

	(1)	(2)	(3)	(4)
INCENTIVE =	CEO Vega		CFO Vega	
Type of Employee	ACTG FIRM	TAX DEPT	ACTG FIRM	TAX DEPT
INCENTIVE	0.004	0.012*	0.004	0.015**
	(0.963)	(1.905)	(0.916)	(2.267)
Observations	16,251	16,251	13,404	13,404
R-squared	0.041	0.076	0.037	0.060
Controls & FEs	YES	YES	YES	YES

Panel C: Hedge Fund Intervention

	(1)	(2)
Type of Employee	ACTG FIRM	TAX DEPT
INCENTIVE	0.022	0.063**
	(1.389)	(2.215)
Observations	16,606	16,606
R-squared	0.039	0.078
Controls & FEs	YES	YES

Panel D: Analyst Cash Flow Forecasts

	(1)	(2)
VARIABLES	ACTG FIRM	TAX DEPT
INCENTIVE	0.027***	0.045***
	(2.598)	(3.106)
Observations	40,121	40,121
R-squared	0.041	0.051
Controls & FEs	YES	YES

Note: This table presents the results of estimating OLS Regressions of the number of employees with prior public accounting firm experience vs. tax department experience, scaled by total employees, on a set of tax avoidance incentives. All variables are calculated as described in Appendix A. Robust standard errors are clustered by firm. T-statistics are presented in parentheses. *, **, and *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively.

profiles from the tax employees in my sample, and I classify an employee as a compliance-oriented employee if they list 'tax compliance', 'tax reporting' or 'tax provision' as a skill.[42] I classify an employee as non compliance-oriented if the employee did not include one of these three skills. Employees opting not to list any skills in their profile are excluded from this analysis. For each tax avoidance incentive, I estimate two regressions using the number of compliance-oriented employees and non-compliance employees as subsamples in each model, and present the results in Table 10. Overall, this falsification test produced results consistent with my prediction. I find no evidence that managers hire additional compliance-oriented tax employees in response to any of the four tax avoidance incentives examined, and that the additional personnel hiring is concentrated in non-compliance-oriented tax employees. This provides evidence consistent with the assertion that tax employees hired in response to tax avoidance incentives are focusing more on the planning role as opposed to the compliance role.

Additional robustness tests

I conduct several untabulated robustness tests to mitigate potential concerns with my empirical specification. First, I examine whether my results hold with alternative scalars for my dependent variable (as opposed to the total number of employees). I re-estimate my main regressions using total assets as the denominator of choice. My results are generally robust to this specification. I also find that my results are robust to using the logarithm of tax department size as my dependent variable, as opposed to scaling it.

Second, I address the possibility that my results may be driven by the fact that tax department size is increasing over time. While year fixed effects mitigate this concern, it is possible that larger firms experience greater increases in tax personnel hiring over time

[42] An alternate method to classify tax employees is to examine the job descriptions they provide on *LinkedIn*. However, the majority of employees in my sample do not provide a description of their role when listing their work experience.

Table 10
The Relationship Between Tax Avoidance Incentives and Tax Department Size – Employees with Tax Compliance Skillsets vs. Non-Tax Compliance Skillsets.

Panel A: Financial Constraints (Combined Measure)

	(1)	(2)
Type of Employee	COMPL	NON-COMPL
INCENTIVE	0.004	0.018***
	(1.573)	(2.855)
Observations	37,225	37,225
R-squared	0.010	0.040
Controls & FEs	YES	YES

Panel B: Equity Risk Incentives

	(1)	(2)	(3)	(4)
INCENTIVE =	CEO Vega		CFO Vega	
Type of Employee	COMPL	NON-COMPL	COMPL	NON-COMPL
INCENTIVE	0.002	0.016**	0.000	0.016**
	(1.054)	(2.485)	(0.038)	(2.191)
Observations	16,251	16,251	13,404	13,404
R-squared	0.018	0.075	0.017	0.068
Controls & FEs	YES	YES	YES	YES

Panel C: Hedge Fund Intervention

	(1)	(2)
Type of Employee	COMPL	NON-COMPL
INCENTIVE	−0.000	0.060**
	(−0.042)	(2.099)
Observations	16,606	16,606
R-squared	0.018	0.076
Controls & FEs	YES	YES

Panel D: Analyst Cash Flow Forecasts

	(1)	(2)
VARIABLES	COMPL	NON-COMPL
INCENTIVE	0.004	0.064***
	(0.824)	(4.172)
Observations	40,121	40,121
R-squared	0.007	0.036
Controls & FEs	YES	YES

Note: This table presents the results of estimating OLS Regressions of the number of employees that have listed skillsets oriented towards tax compliance (using keywords 'tax compliance', 'tax reporting' and 'provision') vs. other tax employees, scaled by total employees, on a set of tax avoidance incentives. All variables are calculated as described in Appendix A. Robust standard errors are clustered by firm. T-statistics are presented in parentheses. *, **, and *** denote two-tailed statistical significance at 10%, 5%, and 1%, respectively.

relative to the average, which may bias my results. To address this, I re-estimate my regressions by interacting each year fixed effect with indicator variables representing which size decile (measured using assets) the firm belongs to, creating a set of separate year dummies for firms in each size decile. This allows the time trend in tax department size to vary for smaller vs. larger firms. My results are robust to this alternative specification. Third, I re-estimate my regressions by excluding firm-year observations that do not have tax departments (i.e. a *TAXDEPT_SIZE* value of zero). My results are robust to excluding zero tax department firms, indicating that these firms do not drive my results.

Finally, I re-estimate my regressions using a Fixed-Effect Poisson (FEP) regression model, as opposed to OLS. One potential concern with the use of OLS in my main analyses is that, since the number of tax employees is a discrete variable taking on integer values only, a count data regression model (using the unscaled number of employees as the dependent variable) may be appropriate (e.g. (Rock et al., 2001). The FEP model is appropriate for analyzing count data and is very robust to distributional assumptions.[43] I find that all my results are robust to using the FEP model, as opposed to OLS.

Supplementary test – tax function outsourcing

While the majority of tax function investments are allocated to internal tax personnel (e.g. (Mills et al., 1998), firms also regularly engage external tax consultants for tax planning activities. (Slemrod and Venkatesh, 2002) find that approximately 25 % of all tax

[43] (Wooldridge, 1999) shows that the FEP model, when estimated using the quasi-maximum likelihood estimator (QMLE), provides consistent estimates even when the underlying distribution is not Poisson, and only the conditional mean assumption needs to hold. Further, robust standard errors can be computed which are robust to over-dispersion, variance assumptions, and serial correlation.

Table 11
The relationship between tax avoidance incentives and auditor-provided tax service fees - firms with and without tax departments.

	Firms without Tax Departments					Firms with Tax Departments				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
INCENTIVE =	Financial Constraints	CEO Vega	CFO Vega	Hedge Fund	CF Forecasts	Financial Constraints	CEO Vega	CFO Vega	Hedge Fund	CF Forecasts
INCENTIVE	0.070***	0.171	−0.255	0.563**	−0.054	−0.071**	0.005	0.036	−0.025	0.000
	(2.571)	(0.534)	(−1.044)	(1.697)	(−0.582)	(−1.781)	(0.091)	(0.378)	(−0.217)	(0.007)
SIZE	0.126**	0.288	0.157	0.333	0.099**	−0.115*	0.005	0.069	0.014	0.024
	(2.196)	(1.332)	(0.700)	(1.549)	(2.311)	(−1.788)	(0.056)	(0.750)	(0.168)	(0.411)
LN_SEGMENTS	0.318**	−0.192	0.223	−0.161	0.260***	−0.095	−0.038	0.088	−0.040	−0.004
	(2.572)	(−0.464)	(0.450)	(−0.408)	(2.632)	(−0.978)	(−0.312)	(0.666)	(−0.326)	(−0.039)
ROA	0.200**	−0.170	0.401	−0.189	0.033	0.105	0.256	0.319	0.227	−0.027
	(2.496)	(−0.447)	(0.785)	(−0.531)	(0.624)	(0.806)	(1.185)	(1.311)	(1.049)	(−0.238)
BTM	−0.036**	0.062	0.014	0.097	−0.024	0.052**	0.034	0.025	0.033	0.022
	(−2.162)	(0.607)	(0.094)	(0.991)	(−1.496)	(2.195)	(0.849)	(0.550)	(0.839)	(0.936)
FIRM_AGE	−0.039	−0.103	0.173	−0.156	−0.042	−0.114***	−0.029	0.018	−0.025	−0.094***
	(−0.525)	(−0.413)	(0.740)	(−0.618)	(−0.857)	(−2.886)	(−0.475)	(0.303)	(−0.410)	(−3.070)
LEVERAGE	−0.208	−0.070	0.356	−0.243	−0.130	0.097	−0.019	−0.059	−0.011	−0.103
	(−1.425)	(−0.109)	(0.458)	(−0.394)	(−1.220)	(0.595)	(−0.079)	(−0.227)	(−0.046)	(−0.689)
PPE	0.012	−0.059	1.174	0.254	−0.010	−0.020	0.532	0.990*	0.659	0.386
	(0.042)	(−0.056)	(0.997)	(0.240)	(−0.046)	(−0.063)	(1.062)	(1.853)	(1.317)	(1.145)
RD	−0.067	−2.517**	−1.892	−2.765**	0.051	0.000	0.316	0.624	0.328	0.185
	(−0.202)	(−2.165)	(−0.855)	(−2.301)	(0.257)	(0.000)	(0.347)	(0.576)	(0.356)	(0.371)
INTANG	−0.013	0.613	0.814	0.759	0.039	0.401*	0.647**	0.395	0.579*	−0.013
	(−0.062)	(0.892)	(1.324)	(1.124)	(0.227)	(1.724)	(2.166)	(1.198)	(1.920)	(−0.063)
INVENTORY	−1.215***	−1.903	−1.677	−1.846	−0.766**	−1.522***	−1.589**	−1.391*	−1.520**	−1.308**
	(−3.104)	(−1.239)	(−0.891)	(−1.253)	(−2.379)	(−2.680)	(−2.186)	(−1.736)	(−2.076)	(−2.435)
NOL	0.001	−0.227	−0.204	−0.214	−0.062	−0.031	−0.112*	−0.051	−0.126*	−0.019
	(0.016)	(−1.203)	(−0.918)	(−1.156)	(−1.112)	(−0.583)	(−1.648)	(−0.703)	(−1.855)	(−0.347)
CHANGE_NOL	−0.013	0.043	0.099	0.035	−0.019	−0.162**	−0.070	−0.035	−0.069	−0.077
	(−0.345)	(0.486)	(0.988)	(0.411)	(−0.740)	(−2.463)	(−0.677)	(−0.286)	(−0.671)	(−1.356)
FOR_DUMMY	−0.008	0.294	0.216	0.304	0.001	−0.010	−0.255**	−0.130	−0.218*	−0.088
	(−0.103)	(1.325)	(0.845)	(1.414)	(0.011)	(−0.112)	(−2.083)	(−0.910)	(−1.774)	(−1.037)
FOR_INCOME	0.429	−4.643	−3.825	−3.945	−0.396	0.488	0.862	0.216	0.842	1.300*
	(0.434)	(−1.290)	(−0.874)	(−1.129)	(−0.495)	(0.649)	(0.912)	(0.217)	(0.891)	(1.779)
LN_HAVENS	0.036	0.033	0.121	0.028	0.034	0.083**	0.073*	0.088*	0.070*	0.131***
	(0.448)	(0.197)	(0.628)	(0.173)	(0.458)	(2.092)	(1.705)	(1.859)	(1.662)	(3.228)
SGA	0.025	0.232	0.099	0.391	−0.145**	−0.080	0.484	0.560	0.491	−0.100
	(0.251)	(0.443)	(0.132)	(0.752)	(−2.307)	(−0.404)	(1.513)	(1.588)	(1.549)	(−0.629)
TOTAL_FEES	0.449***	0.625**	1.301***	0.633**	0.452***	0.976***	1.100***	1.166***	1.076***	0.987***
	(11.236)	(2.308)	(5.351)	(2.412)	(13.386)	(19.062)	(16.607)	(14.030)	(16.566)	(17.512)
TAXDEPT_SIZE						−0.017	−0.024	−0.008	−0.025	−0.012
						(−0.838)	(−0.753)	(−0.234)	(−0.803)	(−0.689)
Observations	14,748	1,819	1,259	1,859	21,387	20,969	14,103	11,211	14,393	22,964
R-squared	0.170	0.244	0.256	0.247	0.171	0.236	0.304	0.228	0.304	0.252
Other Controls	N/A	YES	YES	YES	YES	N/A	YES	YES	YES	YES
Firm FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	FIRM	FIRM	FIRM	FIRM	FIRM	FIRM	FIRM	FIRM	FIRM	FIRM

Note: This table presents the results of estimating Ordinary Least Squares Regressions of the logarithm of the dollar amount of tax service fees paid to the firm's auditor on a set of tax avoidance incentives, estimated for firms with and without tax departments separately. All variables are calculated as described in Appendix A. Robust standard errors are clustered by firm. T-statistics are presented in parentheses. *, **, and *** denote one-tailed (two-tailed) statistical significance at 10%, 5%, and 1%, respectively, when a prediction is (not) made.

Table A1
Variable definitions.

Variable Name	Definition
Main Variables:	
TAXDEPT_SIZE	The total number of non-intern employees working in the firm with the word 'tax' in the job title, less employees that work in a non-income tax area (e.g. sales and property tax), scaled by total employees in thousands (*EMP*). *Source: LinkedIn*
Altman Z-Score	Measure of financial distress introduced in (Altman, 1968), computed as: ————————————1*{3.3*[(PI + XINT)/AT] + 1.2*(WCAP/AT) +(SALE/AT) + 1.4*(RE/AT) + 0.6*[(CSHO*PRCC_F)/LT]}
KZ Index	The (Kaplan and Zingales, 1997) financial constraints index, computed as: −1*[(IB + DP)/lag(PPENT)] + 0.28*[(AT + PRCC_F*CSHO-CEQ TXDB)/AT] + 3.13*[(DLTT + DLC)/(DLTT + DLC + SEQ)]- 39.36*[(DVC + DVP)/lag(PPENT)]-1.31*(CHE/lag(PPENT))
WW Index	The (Whited and Wu, 2006) financial constraints index, computed as: 0.091*(IB + DP)/AT − 0.062*(Dividend Dummy) + 0.021*DLTT/AT − 0.044*Ln(AT) + 0.102*(Average Industry Sales Growth) − 0.035*(Sales Growth)
Textual	Textual analysis measure of financial constraints used in (Law and Mills, 2015), computed as the number of negative words divided by the total number of words in the 10-K. Examples include: loss, against, limitation, impairment and adverse.
Combined Index	The first component extracted from a principal components analysis of *Altman Z-Score, KZ Index, WW Index,* and *Textual.*
CEO (CFO) Vega	The change in the option portfolio value of the CEO (CFO) for a 1 % change in the stock return volatility of the firm. See (Core and Guay, 2002). *Source: Execucomp*
Post Hedge Fund	An indicator variable equal to 1 for all firm-years after a firm is first targeted by a hedge fund, and 0 for firm-years prior to the hedge fund invention, as well as for firms that have never been targeted by a hedge fund. *Source: AuditAnalytics*
Post Cash Flow Forecast	An indicator variable equal to 1 for all firm-years after a firm receives its first cash flow forecast from an analyst, and 0 for firm-years prior to the first forecast, as well as for firms that have never received a cash flow forecast. *Source: I/B/E/S*
Control Variables:	
SIZE	The natural logarithm of assets (AT)
LN_SEGMENTS	The natural logarithm of 1 plus the number of business segments in the firm.
ROA	Pre-tax income (PI) divided by lagged assets (AT)
BTM	Book value of common equity (CEQ) divided by market value of equity (CSHO*PRCC_F)
FIRM_AGE	Firm age, measured as the current fiscal year (FYEAR) minus the first fiscal year that the firm is in Compustat
LEVERAGE	Long-term debt (DLTT + DLC), divided by assets (AT).
PPE	Net property, plant and equipment (PPENT) divided by assets (AT)
R&D	R&D expenditures (XRD) divided by lagged assets (AT).
INTANG	Intangible assets (INTAN) divided by assets (AT)
INVENTORY	Inventory (INVT) divided by assets (AT)
NOL	Indicator variable equal to 1 if tax-loss carryforwards (TLCF) are greater than 0.
CHANGE_NOL	Change in tax-loss carryforwards (TLCF) divided by lagged assets
FOR_DUMMY	Indicator variable equal to 1 if foreign pre-tax income, tax expense or deferred tax expense (PIFO, TXFO, TXDFO) is greater than 0.
FOR_INCOME	Foreign pretax income (PIFO) divided by lagged assets (AT)
LN_HAVENS	The natural logarithm of one plus the number of tax haven subsidiaries that the firm is present in. *Source: Scott Dyreng's Ex. 21 dataset*
TAX_FEES	The natural logarithm of 1 + tax fees paid to the auditor, in thousands. *Source: AuditAnalytics*
LN_EMPLOYEES	Natural logarithm of the number of employees in the firm (EMP)
SG&A	Selling, general & admin expenses (XSGA), divided by lagged assets
CEO (CFO) DELTA	The change in the portfolio value of the CEO (CFO) for a 1 % change in the stock price of the firm. See (Core and Guay, 2002).
CEO (CFO) AGE	Age of the CEO (CFO).
LN_ANALYSTS	Natural logarithm of one plus the number of analysts following the firm.
TOTAL_FEES	The logarithm of total fees paid to the auditor (TOTAL_FEES)
Other Variables:	
JUNIOR (SENIOR)	Number of tax employees on *LinkedIn* with an analyst-level (manager or executive-level) job title, scaled by *EMP*. Junior job titles include: analyst, accountant and specialist. Senior job titles include: manager, director, and counsel.
ACTG FIRM (TAX DEPT)	Number of senior tax employees on *LinkedIn* with experience in a public accounting firm (tax department) prior to hire, scaled by *EMP*. *NUM PUBLIC ACCT* excludes employees who also have tax department experience. Public accounting experience is identified as having a public accounting firm as the job location (identified through internet searches). Tax department experience is identified by having 'tax' in the job title, and a corporation as the job location (identified through internet searches).
COMPL (NON-COMPL)	Number of senior tax employees on *LinkedIn* that include (exclude) 'tax compliance, 'tax reporting' or 'tax provision' in their list of skills, scaled by *EMP*.

function spending is allocated to external costs. Notably, the firm's auditor is one type of external advisor that many firms utilize for their tax function, also known as 'auditor-provided tax services' (APTS). (Klassen et al., 2016) find that 20 % of firms in their sample file tax returns which are prepared externally by the firm's auditor. They further find that APTS fees are positively related to tax avoidance. Therefore, managers incentivized to increase tax avoidance activities may allocate additional resources to the firm's APTS. This may be particularly true for firms that do not have tax departments, as the entirety of their tax function is outsourced and the costs of starting a tax department may be prohibitively high.

To test this prediction, I investigate the relationship between the four tax avoidance incentives and the APTS fees paid by the firm (obtained from AuditAnalytics). I re-estimate my main regressions and replace *TAXDEPT_SIZE* with *TAX_FEES*, representing the natural logarithm of tax fees paid to the firm's auditor. I estimate the regressions separately on subsamples of firms with and without tax departments during the sample period, as firms without tax departments are more likely to rely on external services. I also control for the total fees paid to the auditor (including audit fees), as well as the firm's tax department size (*TAXDEPT_SIZE*). Table 11 presents the results.

Overall, there is some limited evidence that APTS fees increase when managers are provided with tax avoidance incentives, but only for firms that do not have tax departments.[44] In columns (1) to (5), I find some evidence, among firms without tax departments, that firms pay significantly higher APTS fees when they are either financially constrained or targeted by a hedge fund activist. In columns (6) to (10) however, I find no evidence of an increase in APTS fees for any of the incentives among firms that do have tax departments, suggesting that tax avoidance incentives only influence tax function outsourcing when firms outsource all of their tax-related activities.[45]

Conclusion

In this study, I examine whether managers respond to tax avoidance incentives by increasing investments made in the firm's tax function, using the quantity of tax personnel employed as my primary measure. Using four types of incentives examined in prior literature – financial constraints, equity risk incentives, hedge fund interventions and analyst cash flow forecasts, and using a dataset of tax department employees collected from the professional networking website *LinkedIn*, I find that the quantity of tax personnel employed by the firm increases with each of the four incentives. My results are consistent with prior literature suggesting that managerial influence over firm tax planning is limited to 'tone at the top' effects, such as their ability to invest resources into the tax function.

Overall, my study complements prior literature examining these tax avoidance incentives by highlighting how *inputs* of the tax function respond to these incentives, in contrast with prior studies that only focus on *outputs* of the tax function (i.e. tax savings). The intuitive appeal of this approach is that it directly links these incentives with a specific managerial action, rather than the outcomes of these actions. The common definition of an 'incentive' involves the incitement of action and effort. However, since tax avoidance is not an area that managers generally specialize in, it is unlikely that managers exert effort personally in the development and execution of tax strategies. The results of my study suggest that the 'action and effort' incited by these incentives may be observable through an increase in tax personnel hiring, an indication that managers are allocating additional resources towards the tax function. Future researchers examining tax avoidance incentives may wish to strengthen their results by demonstrating, in conjunction with improved tax avoidance outcomes, that their incentive measure is related to an increase in tax function investments.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix A

Table A1

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[44] Note that the sample size for the non-tax department sample is very small in the equity risk incentive and hedge fund regressions due to the sample being restricted to S&P 1500 firms, as most of these firms have a tax department during the sample period.

[45] Interestingly, firms with tax departments appear to invest *less* resources in APTS after being financially constrained. Combined with the results in Table 4, this suggests that firms might substitute APTS fees for tax personnel investments when financially constrained. This may explain how financially constrained firms obtain resources to invest in the tax department despite a lack of internal funds.

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